

福建苔类和角苔类植物最新名录与区系分析*

张晓青¹, 朱瑞良^{1**}, 黄志森², 陈允泰², 陈文伟²

(1 华东师范大学生命科学学院, 上海 200062; 2 戴云山国家级自然保护区, 福建 德化 362503)

摘要: 福建地处亚热带, 其维管植物多样性已经有过广泛的研究, 但其苔类和角苔类植物的多样性却鲜为人知。在本研究中, 作者基于先前的苔藓植物文献报道和近期的野外工作以及对华东师范大学标本馆部分馆藏标本的研究结果, 编写了福建苔类和角苔类植物的最新名录。福建共有苔类植物 41 科 79 属 351 种, 角苔类植物 1 科 4 属 6 种。本研究新增福建苔类新记录 82 种。福建苔类和角苔类植物区系主要由细鳞苔科 (94 种), 耳叶苔科 (32 种), 羽苔科 (25 种), 扁萼苔科 (23 种) 和指叶苔科 (21 种) 等一些热带和亚热带的大科组成。除种数较多的属以外, 63 个属的种数不足 5 种, 其中包括 33 个单种属。福建苔类和角苔类植物的区系地理分布主要以东亚、热带亚洲和北温带成分为主。福建特有种仅 *Solenostoma parvipерianthum* 一种。与台湾相比, 尽管两地植物间具有较高的相似性, 福建在苔类和角苔类植物的多样性以及特有成分上都还远不及台湾丰富。

关键词: 角苔植物门; 生物多样性; 区系; 苔类植物门; 福建

中图分类号: Q 949, Q 948

文献标识码: A

文章编号: 2095-0845(2011)01-101-22

Liverworts and Hornworts of Fujian, China: an Updated Checklist and Bryofloristic Accounts

Xiao-Qing ZHANG¹, Rui-Liang ZHU^{1**}, Zhi-Sen HUANG²,
Yun-Tai CHEN², Wen-Wei CHEN²

(1 Department of Biology, School of Life Science, East China Normal University, Shanghai 200062, China;

2 Daiyunshan National Nature Reserve, Dehua 362503, China)

Abstract: Fujian, located in the subtropics of southeastern China, is a province on the southeast coast of China directly across from Taiwan. Although the diversity of vascular plants of Fujian has been extensively studied, the diversity of liverworts and hornworts of this province is poorly understood. In this study, an updated checklist of Fujian liverworts and hornworts is provided based on published bryological literatures and our recent fieldwork as well as some specimens deposited in the herbarium of East China Normal University. The liverwort and hornwort flora of Fujian consists of 351 species of liverworts belonging to 79 genera in 41 families, and six species of hornworts belonging to four genera in one family. The present paper contributes 82 species as new records for this province. Tropical and subtropical families, such as Lejeuneaceae (94 spp.), Frullaniaceae (32 spp.), Plagiochilaceae (25 spp.), Radulaceae (23 spp.) and Lepidoziaceae (21 spp.) are the primary components of Fujian liverwort and hornwort flora. Sixty-three genera are represented by fewer than five species including 33 with only one representative species. The areal-type of Fujian liverworts and hornworts is mainly dominated by the East Asia element, the Tropical Asia element and the North Temperate element. Only one species, *Solenostoma parvipерianthum*, is endemic to this province. In comparison with Taiwan, despite the close affinity, the diversity and the endemism of Fujian liverworts and

* Foundation items: This research was sponsored by the National Natural Science Foundation of China (30825004), the Program of Shanghai Subject Chief Scientist (08XD14016), and 211 Project for the East China Normal University

** Author for correspondence; E-mail: rlzhu@bio.ecnu.edu.cn

Received date: 2011-01-07, Accepted date: 2011-01-24

hornworts are still far behind those of Taiwan.

Key words: Anthocerotophyta; Biodiversity; Flora; Marchantiophyta; Fujian

Fujian province, covering an area of 121 400 km², is situated in southeastern China, between 115°50'–120°40' E, 23°33'–28°20' N. Being the transitional zone for the central subtropics and southern subtropics, Fujian is also an important node link of the Himalaya-Taiwan bryophyte immigration route (Zhu and Wang, 2004).

The topography of Fujian features a hilly, mountainous area accounting for 87.3% of the entire province. There are several high mountains over 1 000 m above the sea level in Fujian. The most well known one is Mt. Wuyi situated in the northwestern part with the highest peak Huanggang (2 158 m above the sea level). Another two main mountains are Mt. Daiyun and Mt. Jiufeng, both situated across the central part of Fujian (Huang and Zha, 2003). This province also possesses the highest percentage of forest coverage (62.96%) in mainland China (Yang, 2010).

Located in the subtropics, the province has a typical subtropical maritime monsoon climate, with an average annual precipitation of 1 400–2 000 mm, an average temperature of 17–21°C and a relative humidity of 75%–85% (Yang, 2010). The favourable climate conditions, along with diverse topography and geographical location lead to its relatively rich biodiversity compared to the rest of China (Wan *et al.*, 2007), which is only inferior to Yunnan and Guangxi. It is reported that there are 4703 vascular plant species occurring in this province (Huang and Zha, 2003). However, the overall diversity of liverworts and hornworts of this province is scarcely known.

Although the earliest collection can be traced back to 1887 (Carl, 1931), the first record of Fujian liverworts and hornworts did not appear until the publication of *Symbolae Sinicae*, in which Verdoorn (1930) reported three taxa, *Frullania moniliata* subsp. *obscura* [= *Frullania moniliata* (Reinw. *et al.*) Mont.], *Frullania muscicola* Steph. and *Frul-*

lania muscicola var. *chungii* [= *Frullania nepalensis* (Spreng.) Lehm. & Lindenb.] from Fujian. The earliest collecting of Fujian bryophytes by the Chinese began around 1925, when H. -H. Chung from Xiamen University made some collections in Fuzhou. However, lack of necessary literature and herbaria forced him to send his specimens to foreign bryologists for identification. The results were later published by Thériot (1929, 1932), Verdoorn (1930) and Bartram (1935). The hepatic flora of Fujian was subsequently investigated by Chao (1943), who reported 30 liverwort species from Fujian with Haplomitriaceae recorded for the first time in China based on his collections in Nanping, Sanming, Yong'an and Changting. This was considered to be the first paper of the hepatics of China (Wu *et al.*, 1981) which was not cited in Piippo's Annotated catalogue of Chinese Hepaticae and Anthocerotae (Piippo, 1990).

The decades between the 1950s and 1990s constituted the most active periods for the collection of Fujian bryophytes. In 1955, P. -C. Chen organized a bryological research group and made his first expedition to Mt. Wuyi (Li and Wu, 1993). Based on these collections, Chen and Wu (1964) reported 13 epiphyllous liverworts with two new species and one new variety from Fujian. Later, during 1979–1984, the Mt. Wuyi research group extensively investigated Mt. Wuyi and collected thousands of bryophyte specimens (Li and Wu, 1993). On the basis of this fieldwork, Wu *et al.* (1983) listed 22 hepatic species from Mt. Wuyi. A serial of additional papers concerning bryophytes from Mt. Wuyi were published by the same authors in the 1980s (Wu *et al.*, 1982, 1984, 1987a, b, c).

The first checklist of Fujian liverworts and hornworts was prepared by Piippo (1990) who enumerated 85 liverworts and hornworts from Fujian. The second checklist of Fujian liverworts and horn-

worts appeared in Zhang and Lai (1993), which contained 145 species. In the same year, Li and Wu (1993) published a list of bryophytes from Wuyishan Nature Reserve containing 136 liverworts and hornworts based on previous collections from this area. Another expedition to Longqishan Nature Reserve was carried out during 1991–1992. Over 3000 bryophytes specimens were collected (Li, 1994). The results showed that 98 species of liverworts and hornworts were present in this area (Li, 1994). Later, Li (1997) reported several epiphyllous liverworts from Wanmulin Nature Reserve based on his collections in this area in 1986. In 1999, R.-L. Zhu visited Mt. Wuyi especially in search of epiphyllous liverworts and the results were published in Zhu and So (2001). In the same year, Y.-F. Wang and J. Zhu made an extensive collection in Eastern Jiufeng Mountain (Zhu and Wang, 2004). More recently, Gao (2003) listed 46 liverwort species from Fujian. Subsequently, Gao and Wu (2008) additionally listed 53 hepatic species from this province. The following map (Fig. 1) shows the spots of historical collections of liverworts and hornworts (marked as A-K) in Fujian, as well as our recent sampled localities (L-M).

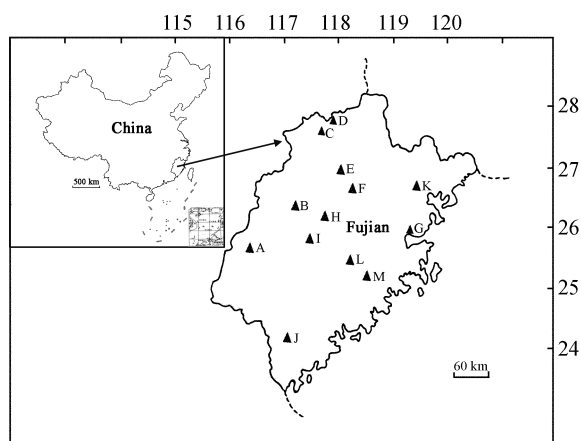


Fig. 1 Map of Fujian with collection localities

A: Changting County; B: Longqishan Nature Reserve; C: Sangang Village; D: Wuyishan National Nature Reserve; E: Wanmulin Nature Reserve; F: Nanping City; G: Fuzhou City; H: Sanming City; I: Yong'an City; J: Nanjing County; K: Ningde City; L: Daiyunshan National Nature Reserve; M: Shiniushan National Forest Park

In fact, owing to constant reports on interesting species of Fujian, floristic knowledge of liverworts and hornworts in this province has greatly increased since the publication of the first checklist (Piippo, 1990). The representative papers include, Piippo (1996), Zhu and So (1997), He (1997b), Yi and Gao (1998), Zhu and So (1999a, b, c), Gao and Cao (2000), Potemkin (2000), So (2001a), Zhu and So (2001), Zhu and Long (2003), Potemkin *et al.* (2004), Gao and Wu (2005), Zhu and Gradstein (2005), etc.

Despite great changes that have taken place in the liverwort and hornwort flora of Fujian, the liverwort and hornwort flora of Fujian has not been well investigated. Firstly, in spite of the numerous collections made in this province, previous collections were mostly from Mt. Wuyi. Few bryologists, however, have paid attention to Mt. Daiyun, the second largest mountain in Fujian. Secondly, lots of specimens collected remained unidentified for decades. Thirdly, most of the available information for this province is either outdated or fragmented. Furthermore, although comparisons of vascular plant flora between Fujian and Taiwan have been done (Zeng, 1983; Huang and Zha, 2003), the relationship of liverworts and hornworts between these two regions has never been explored. Thus, we attempt to carry out our present study to provide a comprehensive overview of the diversity of liverworts and hornworts of Fujian, and aim to clarify its relationship of liverworts and hornworts with Taiwan.

1 Materials and Methods

The specimens examined for the present study include the collections made by the present authors from Daiyunshan National Nature Reserve and Shiniushan National Forest Park during 2009–2010. The additional specimens were collected by Y.-F. Wang and J. Zhu from Eastern Jiufeng Mountain in 1999, and by J. Wang and H. Hang from Nanjing County in 2008. The present checklist of Fujian liverworts and hornworts was compiled based on records from

published bryological literature and our recent examination of available specimens. All specimens are deposited in the herbarium of East China Normal University (HSNU).

The bryofloristic accounts are based on the present checklist. The phytogeographical distribution pattern of liverworts and hornworts of Fujian mainly follows Wu's (1991) areal types of seed plants as well as its own characteristics of geographical distribution. The comparison is mainly based on the present checklist and the checklist of Taiwan (Wang *et al.*, 2011). We choose Gleason's species richness index (D_{cl}) to reveal the overall diversity of species (Gleason, 1922) and the Kroeber's percentage of similarity for the affinity between these two regions (Balgooy, 1971).

Species names in the checklist are arranged in alphabetical order with references cited. The nomenclature mainly follows Crandall-Stotler *et al.* (2009), Váňa *et al.* (2010) and other recent publications (Konstantinova *et al.*, 2009; Feldberg *et al.*, 2010; Söderström *et al.*, 2010; Ye and Zhu, 2010). New records for Fujian are marked with asterisks.

2 Results

2.1 Liverwort and hornwort flora

The number of the liverwort and hornwort species known from Fujian has risen from 85 (Piippo, 1990) to 357. A total of 351 species of liverworts belonging to 79 genera in 41 families and six species of hornworts belonging to four genera in one family are reported. The present study contributes 82 species as new records for this province. The Gleason's species richness index (D_{cl}) of Fujian liverworts and hornworts reaches as high as 30.41.

The liverwort and hornwort flora consists mainly of tropical and subtropical families, such as Lejeuneaceae (94 spp.), Frullaniaceae (32 spp.), Plagiochilaceae (25 spp.), Radulaceae (23 spp.) and Lepidoziaceae (21 spp.), among which Lejeuneaceae is the largest, accounting for 26.26% of the total liverwort and hornwort flora of Fujian. Several fami-

lies, such as Scapaniaceae (18 spp.), Solenostomaceae (16 spp.) and Porellaceae (12 spp.) are also primary components of the liverwort and hornwort flora of Fujian. Genera with more than 10 species are *Cololejeunea* (33 spp.), *Frullania* (32 spp.), *Radula* (23 spp.), *Plagiochila* (23 spp.), *Lejeunea* (18 spp.), *Cheilolejeunea* (14 spp.), *Solenostoma* (14 spp.), *Bazzania* (13 spp.), *Scapania* (13 spp.) and *Porella* (12 spp.), which compose 54.62% of the total liverwort and hornwort flora. Sixty-three genera are represented by fewer than five species including 33 which have only one representative species. Eight species, *Neotrichocolea bissetii*, *Solenostoma lixingjiangii*, *Cololejeunea magnilobula*, *Hattoria yakushimensis*, *Kurzia sinensis*, *Nowellia aciliata*, *Porella obtusiloba*, *Trichocoleopsis tsinlingensis* are listed in the national red list of Chinese endangered bryophytes (Cao *et al.*, 2006a), including three species, *Cololejeunea magnilobula*, *Hattoria yakushimensis* and *Kurzia sinensis* belonging to the world red list of bryophytes (Tan *et al.*, 2000).

In contrast, the diversity of the liverwort and hornwort flora of Taiwan with 503 species of liverworts belonging to 117 genera in 52 families, 19 species of hornworts belonging to six genera in three families (Wang *et al.*, 2011) and the Gleason's species richness index (D_{cl}) of 49.66 is much richer than that of Fujian.

2.2 Phytogeographical aspects and bryofloristic affinities

The phytogeographical distribution patterns of the liverworts and hornworts of Fujian can be classified into 13 groups. The sum of all the Temperate elements (60.50%) has outshined that of the Tropical elements (35.29%), therefore they dominate the liverwort and hornwort flora of Fujian. Among the 13 elements, the East Asia element, the Tropical Asia element and the North Temperate element, which account for 30.81%, 19.89% and 16.53% respectively, possess an absolute predominance. Out of the 110 East Asiatic distribution species, fifty-two be-

long to the Sino-Japan element. So far as we know, 18 species accounting for 5.04% of the total flora are endemic to China. Only one species, *Solenostoma parvipertianthum*, is endemic to this province. Taiwan, however, has a more remarkable record of 13 endemic species (Wang *et al.*, 2011).

With respect to the similarity between the liverwort and hornwort flora of Fujian and Taiwan, 260 species and 78 genera are recorded as common species and genera with the Kroeber's percentage of similarity of 61.32% and 78.69%, respectively. All the families occurring in Fujian are also distributed in Taiwan,

while 13 families occurring in Taiwan are absent in Fujian, including Acrobolbaceae, Adelanthaceae, Anthocerotaceae, Calyculariaceae, Cyathodiaceae, Dendrocerotaceae, Lepicoleaceae, Lunulariaceae, Mastigophoraceae, Monosoleniaceae, Schistochilaceae, Targioniaceae and Treubiaceae. There are five genera lacking in Taiwan, *Albiellopsis*, *Biantheridium*, *Hattoria*, *Neotrichocolea* and *Otolejeunea*, most of them restricted to East Asia. Whereas, 45 genera that occur in Taiwan are absent in Fujian, such as *Acrobolbus*, *Gottschelia*, *Mastigophora*, *Nipponolejeunea*, *Schistochila*, *Targionia*, *Wettsteinia*, etc.

2.3 Updated checklist

- Acrolejeunea pusilla* (Steph.) Grolle & Gradst. –Zhang and Lai (1993 as *Ptychocoleus nipponicus*), So and Zhu (1996a), present study.
- * *Albiellopsis parvifolia* (Steph.) R. M. Schust. –present study.
- Anastrophyllum minutum* (Schreb.) R. M. Schust. var. *minutum* –Gao and Wu (2008).
- Aneura pinguis* (L.) Dumort. –Li and Wu (1993), Zhang and Lai (1993), Li (1994), present study.
- * *Anthoceros angustus* Steph. –present study.
- A. punctatus* L. –Zhang and Lai (1993), present study.
- Apomarsupella revoluta* (Nees) R. M. Schust. –Zhang and Lai (1993), Gao and Cao (2000), Gao and Lai (2003 as *Marsupella revoluta*).
- * *Archilejeunea amakawana* Inoue –present study.
- * *A. kiushiana* (Horik.) Verd –present study.
- * *A. planiuscula* (Mitt.) Steph. –present study.
- Bazzania angustifolia* Horik. –Li (1994).
- B. asperrima* Steph. –Gao and Cao (2000), Gao (2003), present study.
- B. bidentula* (Steph.) Steph. ex Yasuda –Zhang and Lai (1993), present study.
- * *B. bilobata* N. Kitag. –present study.
- B. denudata* (Torr. ex Gottsche *et al.*) Trevis. –Zhang and Lai (1993).
- * *B. fauriana* (Steph.) S. Hatt. –present study.
- B. japonica* (Sande Lac.) Lindb. –Li *et al.* (1986), Wu *et al.* (1984), Mizutani and Chang (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Gao (2003), Gao and Lai (2003), present study.
- * *B. magna* Horik. –present study.
- B. ovistipula* (Steph.) Abeyw. –Mizutani and Chang (1986), Piippo (1990), present study.
- * *B. pearsonii* Steph. –present study.
- B. praerupta* (Reinw. *et al.*) Trevis. –Zhang and Lai (1993).
- B. tridens* (Reinw. *et al.*) Trevis. –Wu *et al.* (1984 as *Bazzania albicans*), Mizutani and Chang (1986), Mizutani and Chang (1986 as *B. oshimensis*), Piippo (1990), Piippo (1990 as *B. oshimensis*), Li and Wu (1993 as *B. oshimensis*), Li (1994), Zhang and Lai (1993), Gao and Cao (2000), Gao and Cao (2000 as *B. oshimensis*), Gao (2003), Gao (2003 as *B. oshimensis*), Gao and Lai (2003), Gao and Lai (2003 as *B. oshimensis*), present study.
- B. trilobata* (L.) Gray –Chao (1943 as *Bazzania tridentoides*), Mizutani and Chang (1986), Piippo (1990), Li and Wu (1993), Gao and Cao (2000), Li (1994), Gao (2003), Gao and Lai (2003), present study.

- Biantheridium undulifolium* (Nees) Konstant. & Vilnet –Gao and Cao (2000 as *Jamesoniella undulifolia*), Gao and Bai (2001 as *J. undulifolia*), Gao (2003 as *J. undulifolia*), Gao and Lai (2003 as *J. undulifolia*).
- Blasia pusilla* L. –Zhang and Lai (1993).
- Blepharostoma minus* Horik. –Li and Wu (1993), Li (1994), Zhang and Lai (1993), present study.
- B. trichophyllum* (L.) Dumort. –Wu *et al.* (1984), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Gao and Cao (2000), Gao (2003), Gao and Lai (2003), Zhang and Wu (2006), present study.
- Calypogeia arguta* Nees & Mont. –Chao (1943), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Gao (2003), present study.
- C. azurea* Stotler & Crotz –Li (1994 as *Calypogeia trichomanis*), Gao and Cao (2000 as *C. trichomanis*), Gao (2003 as *C. trichomanis*), present study.
- C. fissa* (L.) Raddi –Chao (1943).
- C. japonica* Steph. –Li (1994 as *C. tsukushiensis*), present study.
- C. muelleriana* (Schiffn.) Müll. Frib. –Gao (2003).
- C. neesiana* (C. Massal. & Carestia.) Müll. Frib. –Li and Wu (1993), Zhang and Lai (1993).
- C. tosana* (Steph.) Steph. –Li and Wu (1993), Li and Wu (1993 as *Calypogeia tosana* var. *yoshinagana*), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Zhu and So (2001), Gao (2003), Zhang and Wu (2006), present study.
- Cephalozia ambigua* C. Massal. –Li and Wu (1993), Zhang and Lai (1993)
- * *C. gollanii* Steph. –present study.
- C. bicuspidata* (L.) Dumort. –Li (1994).
- C. hamatiloba* Steph. –Li (1994 as *Cephalozia otaruensis* var. *setiloba*), Zhang and Wu (2006 as *C. otaruensis*), present study.
- * *C. lacunculata* (J. B. Jack ex Gottsche & Rabenh.) Spruce –present study.
- C. lunulifolia* (Dumort.) Dumort. –Li and Wu (1993), Li and Wu (1993 as *Cephalozia media*), Zhang and Lai (1993), Li (1994), Zhang and Wu (2006).
- C. macounii* (Austin) Austin –Zhang and Lai (1993), Gao and Cao (2000), Gao (2003), Gao and Lai (2003).
- * *Cephaloziella breviperianthia* C. Gao –present study.
- C. kiaeri* (Austin) Douin –Zhang and Lai (1993), Li (1994), present study.
- C. microphylla* (Steph.) Douin –Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Gao (2003), Gao and Lai (2003), present study.
- C. spinicaulis* Douin –Zhang and Lai (1993).
- * *Cheilolejeunea ceylanica* (Gottsche) R. M. Schust. & Kachroo –present study.
- C. chenii* R. L. Zhu & M. L. So –Chen and Wu (1964 as *Neurolejeunea fukiensis*), Wu *et al.* (1983 as *N. fukiensis*), Piippo (1990 as *N. fukiensis*), Li and Wu (1993 as *N. fukiensis*), Zhang and Lai (1993 as *N. fukiensis*), Jin (1994 as *N. fukiensis*), He 1997 as *N. fukiensis*, Zhu *et al.* (1999), Zhu and So (2001), Zhu *et al.* (2002).
- * *C. intertexta* (Lindenb.) Steph. –present study.
- * *C. kitagawae* W. Ye & R. L. Zhu –present study.
- C. krakammae* (Lindenb.) R. M. Schust. –Li and Wu (1993 as *Cheilolejeunea ontakensis*), Zhu *et al.* (2002), present study.
- * *C. nipponica* (S. Hatt.) S. Hatt. –present study.
- C. obtusifolia* (Steph.) S. Hatt. –Li and Wu (1993), Zhu *et al.* (2002), Zhu and Long (2003), present study.
- * *C. obtusilobula* (S. Hatt.) S. Hatt. –present study.
- * *C. osumiensis* (S. Hatt.) Mizut. –present study.
- * *C. ryukyuensis* Mizut. –present study.
- C. trapezia* (Nees) Kachroo & R. M. Schust. –Wu *et al.* (1983 as *Cheilolejeunea imbricata*), Piippo (1990 as *C. imbricata*), Li and Wu (1993 as *C. imbricata*), Zhang and Lai (1993 as *C. imbricata* and *C. longiloba*), Zhu and Hu

- (1993 as *C. imbricata*), So and Zhu (1996b as *C. imbricata*), He (1997b as *C. imbricata*), Zhu and So (2001 as *C. imbricata* and *C. longiloba*), Zhu *et al.* (2001 as *C. imbricata*), Zhu *et al.* (2002 as *C. imbricata*), Gao and Cao (2000 as *C. longiloba*), Gao and Lai (2003 as *C. longiloba*), present study.
- * *C. turgida* (Mitt.) W. Ye & R. L. Zhu –present study.
- C. xanthocarpa* (Lehm. & Lindenb.) Malombe-Li *et al.* (1986 as *Leucolejeunea xanthocarpa*), Piippo (1990 as *L. xanthocarpa*), Li and Wu (1993 as *L. xanthocarpa*), Zhang and Lai (1993 as *L. xanthocarpa*), He (1997b as *L. xanthocarpa*), Zhu and So (1999c as *L. xanthocarpa*), Zhu and So (2001 as *L. xanthocarpa*), present study.
- Chiloscyphus fragrans* (Moris & De Not.) J. J. Engel & R. M. Schust. –Chao (1943 as *Lophocolea fragrans*).
- C. integristipulus* (Steph.) J. J. Engel & R. M. Schust. –Gao and Wu (2008).
- * *C. itoanus* (Inoue) J. J. Engel & R. M. Schust. –present study.
- C. japonicus* Steph. –Zhang and Lai (1993), present study.
- C. minor* (Nees) J. J. Engel & R. M. Schust. –Chao (1943 as *Lophocolea minor*), Li and Wu (1993 as *L. minor*), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Gao and Wu (2008), present study.
- * *C. muricatus* (Lehm.) J. J. Engel & R. M. Schust. –present study.
- C. polyanthus* (L.) Corda –Li and Wu (1993 as *Chiloscyphus polyanthus* [sic]), Zhang and Lai (1993 as *C. polyanthus* [sic]), Li (1994 as *C. polyanthus* [sic]).
- C. profundus* (Nees) J. J. Engel & R. M. Schust. –Zhang and Lai (1993), Gao and Wu (2008), present study.
- Cololejeunea appressa* (A. Evans) Benedix –Gao and Cao (2000), Zhu and So (2001), Gao and Lai (2003), present study.
- C. ceratilobula* (P. C. Chen) R. M. Schust. –Zhu and So (1998a), Gao and Cao (2000), Zhu and So (2001), Zhu *et al.* (2001), present study.
- C. denticulata* (Horik.) S. Hatt. –Chen and Wu (1964), Wu *et al.* (1983 as *Leptocolea denticulata*), Piippo (1990), Li and Wu (1993 as *L. denticulata*), Zhang and Lai (1993), Zhu and Hu (1993), Li (1994 as *L. denticulata*), He (1997b), Gao and Cao (2000), Zhu and So (2001), Gao and Lai (2003), present study.
- C. floccosa* (Lehm. & Lindenb.) Schiffn. –Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), He (1997b), Gao and Cao (2000), present study.
- C. grossepapillosa* (Horik.) N. Kitag. –Zhu and So (2001 as *Aphanolejeunea grossepapillosa*), Gao and Lai (2000 as *A. grossepapillosa*).
- C. haskarlana* (Lehm. & Lindenb.) Schiffn. –Li and Wu (1993 as *Cololejeunea hispidissima*), Li (1994 as *C. hispidissima*), Zhu and So (2001), Gao and Lai (2003).
- * *C. horikawana* (S. Hatt.) Mizut. –present study.
- C. inflata* Steph. –Chen and Wu (1964), Wu *et al.* (1983), Li (1985), Tixier (1978), Piippo (1990), Piippo (1990 as *Cololejeunea oshimensis*), Li and Wu (1993 as *C. oshimensis*), Zhang and Lai (1993 as *C. oshimensis*), Li (1994 as *C. oshimensis*), Zhu (1995), He (1997b), He (1997b as *C. oshimensis*), Gao and Cao (2000), Zhu and So (2001), Zhu *et al.* (2001), Gao and Lai (2003), present study.
- C. japonica* (Schiffn.) S. Hatt. ex Mizut. –Zhu and So (2001).
- * *C. kodamae* Kamim. –present study.
- * *C. lanciloba* Steph. –present study.
- C. latistyla* R. L. Zhu –Zhu and So (2001), Gao and Lai (2003).
- C. longifolia* (Mitt.) Benedix ex Mizut. –Wu *et al.* (1983 as *Leptocolea oblonga*), Piippo (1990), Li and Wu (1993 as *L. oblonga*), Zhang and Lai (1993), Li (1994 as *L. oblonga*), He (1997b), Gao and Cao (2000), Zhu and So (2001), Zhu and Long (2003), present study.
- C. macounii* (Spruce ex Underw.) A. Evans –Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Zhu (1995), He (1997b), Zhu and So (2001), present study.
- * *C. magnilobula* (Horik.) S. Hatt. –present study.
- C. ocellata* (Horik.) Benedix –Chen and Wu (1964), Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang

- and Lai (1993), Zhu and Hu (1993), Zhu (1995), He (1997b), Gao and Cao (2000), Zhu and So (2001), Gao and Lai (2003), present study.
- C. ocelloides* (Horik.) Mizut. –Chen and Wu (1964), Wu *et al.* (1983), Wu *et al.* (1987a), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Zhu and Hu (1993), Li (1994), He (1997b), present study.
- C. peraffinis* (Schiffn.) Schiffn. –Chen and Wu (1964 as *Cololejeunea magnipapillosa*), Wu *et al.* (1983 as *C. magnipapillosa*), Piippo (1990 as *C. magnipapillosa*), Li and Wu (1993 as *C. magnipapillosa*), Zhang and Lai (1993 as *C. magnipapillosa*), Zhu and Hu (1993 as *C. magnipapillosa*), Zhu (1995), He (1997b as *C. magnipapillosa*), Gao and Cao (2000), Zhu and So (2001), Gao and Lai (2003), present study.
- C. planissima* (Mitt.) Abeyw. –Wu *et al.* (1983 as *Pedinolejeunea planissima*), Piippo (1990), Li and Wu (1993 as *P. planissima*), Zhang and Lai (1993), Zhu and Hu (1993), He (1997b), Gao and Cao (2000), Zhu and So (2001), Zhu *et al.* (2001), Gao and Lai (2003), present study.
- C. pseudofloccosa* (Horik.) Benedix –Chen and Wu (1964), Wu *et al.* (1983), Li (1985), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Zhu and Hu (1993), Li (1994), Zhu (1995), He (1997b), Zhu and So (2001), present study.
- C. raduliloba* Steph. –Zhu and So (2001), Zhu *et al.* (2001), present study.
- C. rotundilobula* (P. C. Wu & P. J. Lin) Piippo –Zhu and So (2001), Gao and Lai (2003), Zhu *et al.* (2001).
- C. schmidtii* Steph. –Zhu and So (2001), Gao and Lai (2003).
- * *C. serrulata* Steph. –present study.
- C. shibiensis* Mizut. –Zhu and So (2001), present study.
- C. spinosa* (Horik.) Pandé & R. N. Misra –Chen and Wu (1964), Wu *et al.* (1983), Li (1985), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Zhu (1995), He (1997b), Zhu and So (2001), Zhu *et al.* (2001), present study.
- C. subfloccosa* Mizut. –Zhu (1995), Zhu and So (2001), Zhu *et al.* (2001).
- C. subkodamae* Mizut. –Zhu (1995), Zhu and So (2001).
- * *C. subocelloides* Mizut. –present study.
- C. tenella* Benedix –Zhu and So (1999a), Gao and Cao (2000), Gao and Lai (2003), Zhu and So (2001), present study.
- C. trichomanis* (Gottsche) Steph. –Li (1994 as *Leptocolea dolichostyla*), But *et al.* (2000 as *Cololejeunea goebelii*), Gao and Cao (2000 as *C. goebelii*), Zhu and So (2000d as *C. goebelii*), Zhu and So (2001 as *C. goebelii*), Zhu *et al.* (2001 as *C. goebelii*), Gao and Lai (2003 as *C. goebelii*), Zhang and Wu (2006 as *C. goebelii*), present study.
- C. verdoornii* (S. Hatt.) Mizut. –Chen and Wu (1964), Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Zhu (1995), He (1997b), Zhu and So (2001).
- C. yakusimensis* (S. Hatt.) Mizut. –Chen and Wu (1964 as *Cololejeunea latilobula* var. *wuyiensis*), Wu *et al.* (1983 as *Pedinolejeunea himalayensis* var. *wuyiensis*), Piippo (1990 as *C. latilobula* var. *wuyiensis*), Li and Wu (1993 as *P. himalayensis* var. *wuyiensis*), Zhang and Lai (1993 as *C. latilobula* var. *wuyiensis*), Jin (1994 as *P. himalayensis* var. *wuyiensis*), He (1997b as *C. latilobula* var. *wuyiensis*), Zhu and So (2001).
- Colura tenuicornis* (A. Evans) Steph. –Chen and Wu (1964), Wu *et al.* (1983), Li (1985), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Zhu and Hu (1993), He (1997b), Gao and Cao (2000), Gao and Lai (2003), Zhu and So (2001), Zhu *et al.* (2001), present study.
- Conocephalum conicum* (L.) Dumort. –Chao (1943 as *Fegatella conica*), Li *et al.* (1986), Li (1990), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), present study.
- C. japonicum* (Thunb.) Grolle –Li *et al.* (1986 as *Conocephalum supradecompositum*), Piippo (1990), Li and Wu (1993 as *C. supradecompositum*), Li (1994), present study.
- Cylindrocolea recurvifolia* (Steph.) Inoue –Li and Wu (1993 as *Cephaloziella recurvifolia*), Zhang and Lai (1993 as *C. recurvifolia*), Li (1994 as *C. recurvifolia*), Gao and Cao (2000), Gao (2003), Gao and Lai (2003), present study.
- * *C. tagawae* (N. Kitag.) R. M. Schust. –present study.
- * *Diplophyllum apiculatum* (A. Evans) Steph. –present study.

- * *D. serrulatum* (Müll. Frib.) Steph. –present study.
- D. taxifolium* (Wahlenb.) Dumort. –Li (1994), Gao and Wu (2008).
- Drepanolejeunea angustifolia* (Mitt.) Grolle –Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), He (1997b), Zhu and So (2001), Zhu and Long (2003), present study.
- D. commutata* Grolle & R. L. Zhu –Grolle and Zhu (2000), Zhu *et al.* (2001).
- D. erecta* (Steph.) Mizut. –Wu *et al.* (1983 as *Drepanolejeunea monophthalma*), Piippo (1990), Li and Wu (1993 as *D. monophthalma*), Zhang and Lai (1993), Zhu and Hu (1993), He (1997b), Zhu and So (2001), Zhu and Long (2003), present study.
- * *D. fleischeri* (Steph.) Grolle & R. L. Zhu –present study.
- D. foliicola* Horik. –Wu and Luo (1978 as *Leptolejeunea yangii*), Wu *et al.* (1983 as *Rhaphidolejeunea foliicola*), Piippo (1990 as *L. yangii*), Li and Wu (1993 as *R. foliicola*), Zhu and Hu (1993 as *L. yangii*), Li (1994 as *R. foliicola*), He (1997b as *L. yangii*), Gao and Cao (2000 as *R. foliicola*), Grolle and Zhu (2000), Zhu and So (2001), Zhu *et al.* (2001), present study.
- D. ternatensis* (Gottsche) Schiffn. –Zhang and Lai (1993), Zhu and So (2001), present study.
- D. vesiculosa* (Mitt.) Steph. –Li and Wu (1993), Gao and Cao (2000), Gao and Lai (2003), present study.
- D. yunnanensis* (P. C. Chen) Grolle & R. L. Zhu –Zhang and Lai (1993 as *Rhaphidolejeunea yunnanensis*).
- Dumortiera hirsuta* (Sw.) Nees –Chao (1943 as *Dumortiera trichocephala*), Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Li (1994), Zhang and Lai (1993), present study.
- Folioceros fuciformis* (Mont.) D. C. Bharadwaj –Li *et al.* (1986 as *Anthoceros miyabeanus*), Piippo (1990), Li and Wu (1993 as *A. miyabeanus*), Zhang and Lai (1993).
- * *Fossombronia japonica* Schiffn. –present study.
- * *Frullania acutiloba* Mitt. var. *schiffneri* Verd –present study.
- * *F. amplocrania* Steph. –present study.
- * *F. aoshimensis* Horik. –present study.
- * *F. apiculata* (Reinw. *et al.*) Nees –present study.
- * *F. bolanderi* Austin –present study.
- F. davurica* Hampe subsp. *davurica* –Zhang and Lai (1993).
- F. densiloba* Steph. ex A. Evans –Wu *et al.* (1983), Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), present study.
- * *F. diversitexta* Steph. –present study.
- F. ericoides* (Nees) Mont. var. *ericoides* –Zhang and Lai (1993), present study.
- * *F. fengyangshanensis* R. L. Zhu & M. L. So –present study.
- F. hamatiloba* Steph. –Li and Wu (1993), Zhang and Lai (1993).
- * *F. hypoleuca* Nees –present study.
- F. jackii* Gottsche –Li and Wu (1993).
- F. kagoshimensis* Steph. –Zhang and Lai (1993), present study.
- * *F. kashyapii* Verd. –present study.
- F. linii* S. Hatt. –Hattori and Lin (1985), Piippo (1990), Gao and Cao (2000), Gao and Lai (2003), present study.
- * *F. meyeniana* Lindenb. –present study.
- F. moniliata* (Reinw. *et al.*) Mont. –Verdoorn (1930 as *Frullania moniliata* subsp. *obscura*), Verdoorn (1934 as *F. tamarisci* subsp. *balansae*), Inoue (1961 as *F. balansae*), Wu *et al.* (1983), Wu *et al.* (1987a), Hattori and Lin (1985 as *F. tamarisci* subsp. *obscura*), Hattori and Lin (1985 as *F. tamarisci* subsp. *balansae*), Li (1985 as *F. tamarisci* subsp. *moniliata*), Li *et al.* (1986), Li (1990 as *F. tamarisci* subsp. *moniliata*), Piippo (1990), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Zhu and So (2001), Gao and Lai (2003), present study.
- F. monocera* (Hook. f. & Taylor) Taylor –Li and Wu (1993), Zhang and Lai (1993), present study.
- F. motoyana* Steph. –Hattori (1974), Piippo (1990), Gao and Cao (2000), present study.

- F. muscicola* Steph. –Verdoorn (1930), Chao (1943), Hattori (1974), Wu *et al.* (1983), Li (1985), Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Zhu and So (2001), Gao and Lai (2003), present study.
- F. nepalensis* (Spreng.) Lehm. & Lindenb. –Verdoorn (1930 as *Frullania muscicola* var. *chungii*), Chao (1943 as *F. muscicola* var. *chungii*), Hattori (1974), Wu *et al.* (1983), Li *et al.* (1986 as *F. nishiyamensis*), Piippo (1990), Li and Wu (1993), Li and Wu (1993 as *F. nishiyamensis*), Zhang and Lai (1993), Gao and Cao (2000), Zhu and So (2001), Gao and Lai (2003), present study.
- F. neurota* Taylor –Zhang and Lai (1993).
- * *F. osumiensis* (S. Hatt.) S. Hatt. –present study.
- * *F. pallide-virens* Steph. –present study.
- * *F. ramuligera* (Nees) Mont. –present study.
- * *F. rhytidantha* S. Hatt. –present study.
- F. riparia* Hampe ex Lehm. –Chao (1943).
- * *F. sinensis* Steph. –present study.
- F. tamarisci* (L.) Dumort. –Li and Wu (1993), present study.
- F. tamarisci* (L.) Dumort. var. *elongatistipula* (Verd.) S. Hatt. –Chao (1943 as *Frullania moniliata* subsp. *obscura* var. *elongatistipula* f. *obtusiloba*).
- * *F. usamiensis* Steph. –present study.
- * *F. valida* Steph. –present study.
- Haplomitrium blumii* (Nees) R. M. Schust. –Gao and Li (1985), Li *et al.* (1986 as *Calobryum blumii*), Piippo (1990), Li and Wu (1993 as *Haplomitrium blumei*), Zhang and Lai (1993).
- H. mnioides* (Lindb.) R. M. Schust. –Chao (1943 as *Calobryum rotundifolium*), Gao and Li (1985), Li *et al.* (1986 as *C. rotundifolium*), Piippo (1990), Li and Wu (1993), Li (1994), Zhang and Lai (1993), Gao (2003), Shi and Zhu (2006), Zhang and Wu (2006), present study.
- H. mnioides* (Lindb.) R. M. Schust. var. *delicatum* C. H. Gao & D. K. Li –Gao and Li (1985), Li and Wu (1993).
- Hattoria yakushimensis* (Horik.) R. M. Schust. –Yi and Gao (1998 as *Hattoria yakushimense* [sic]), Gao and Cao (2000 as *H. yakushimense* [sic]), Gao and Bai (2001 as *H. yakushimense* [sic]), Gao (2003 as *H. yakushimense* [sic]), Gao and Lai (2003 as *H. yakushimensis* [sic]), Cao *et al.* (2006a), Cao *et al.* (2006b), Cao *et al.* (2007), present study.
- Herbertus aduncus* (Dicks) Gray –Li and Wu (1993 as *Herberta minor*), Zhang and Lai (1993), Li (1994 as *H. adunca*), Li (1994 as *H. fragilis*), Zhu (2001 as *H. fragilis*), Gao and Lai (2003), Zhu *et al.* (2006).
- H. dicranus* (Taylor ex Gottsche *et al.*) Trevis. –Li *et al.* (1986 as *Herbertus longifolius*), Piippo (1990), Piippo (1990 as *H. giraldianus*), Li and Wu (1993 as *Herberta chinensis*), Li and Wu (1993 as *H. giraldiana*), Li and Wu (1993 as *H. longifolia*), Zhang and Lai (1993), Zhang and Lai (1993 as *H. giraldianus*), Gao and Cao (2000 as *H. giraldianus*), Gao (2003), Gao (2003 as *H. giraldianus*), Gao and Lai (2003 as *H. giraldianus*), present study.
- H. kurzii* (Steph.) R. S. Chopra –Gao and Cao (2000), Gao (2003).
- H. ramosus* (Steph.) H. A. Mill. –Zhang and Lai (1993 as *Herbertus javanicus*), Gao and Cao (2000), Gao (2003), Gao and Lai (2003), present study.
- H. sendtneri* (Nees) Lindb. –Gao (2003 as *Herbertus delavayi*).
- Heteroscyphus argutus* (Reinw. *et al.*) Schiffn. –Li and Wu (1993), Zhang and Lai (1993), Li (1994), Zhu and So (2001), Zhang and Wu (2006), Gao and Wu (2008), present study.
- H. coalitus* (Hook.) Schiffn. –Li and Wu (1993), Zhang and Lai (1993), Li (1994), Zhu and So (2001), Gao and Wu (2008), present study.
- H. planus* (Mitt.) Schiffn. –Li and Wu (1993), Li (1994), Zhu and So (2001), Gao and Wu (2008), present study.
- H. tener* (Steph.) Schiffn. –Li and Wu (1993), Li (1994), Piippo (1996), present study.
- H. zollingeri* (Gottsche) Schiffn. –Gao and Wu (2008).

- Isotachis japonica* Steph. –Li (1994).
- Jackiella javanica* Schiffn. –Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), So and Zhu (1996a), Zhang and Wu (2006), present study.
- Jubula hutchinsiae* (Hook.) Dumort. subsp. *javanica* (Steph.) Verd. –Wu *et al.* (1984 as *Jubula javanica*), Piippo (1990), Li and Wu (1993 as *J. javanica*), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Gao and Lai (2003), present study.
- J. japonica* Steph. –Zhang and Lai (1993), Li (1994), Zhu and So (2001), present study.
- Jungermannia atrovirens* Dumort. –Li and Wu (1993 as *Jungermannia lanceolata*), Zhang and Lai (1993).
- Kurzia gonyotricha* (Sande Lac.) Grolle –Mizutani and Chang (1986), Piippo (1990), Li and Wu (1993), Li (1994), Gao and Cao (2000), Gao (2003), Zhang and Wu (2006), present study.
- K. pauciflora* (Dicks.) Grolle –Gao (2003).
- K. sinensis* K. C. Chang –Gao and Cao (2000), Gao (2003), Gao and Lai (2003), Cao *et al.* (2006a), Cao *et al.* (2006b), Cao *et al.* (2007), present study.
- K. sylvatica* (A. Evans) Grolle –Gao and Cao (2000), Gao (2003).
- Lejeunea anisophylla* Mont. –Li and Wu (1993 as *Lejeunea borneensis*), Zhang and Lai (1993 as *L. catanduana*), Li (1994 as *L. borneensis*), Zhu and So (2001), Zhu *et al.* (2001), present study.
- L. aquatica* Horik. –Zhang and Lai (1993), present study.
- * *L. cocoes* Mitt. –present study.
- L. compacta* (Steph.) Steph. –Zhu and So (1999b), Gao and Cao (2000), Gao and Lai (2003), present study.
- L. convexiloba* M. L. So & R. L. Zhu –So and Zhu (1998).
- L. curviloba* Steph. –Zhu and So (2001), Zhu and Long (2003).
- L. discreta* Lindenb. –Gao and Cao (2000), present study.
- * *L. eifrigii* Mizut. –present study.
- L. flava* (Sw.) Nees –Chao (1943), Wu *et al.* (1983), Li *et al.* (1986), Piippo (1990), Zhu and Hu (1993), Zhang and Lai (1993), Li (1994), Zhu and So (2000b), Zhu and So (2001), Zhu *et al.* (2001), present study.
- L. japonica* Mitt. –Zhang and Lai (1993), present study.
- L. magohukui* Mizut. –So and Zhu (1998), Zhu and So (1999b), Gao and Cao (2000), Zhu and So (2001), Zhu *et al.* (2001), Gao and Lai (2003), present study.
- L. neelgherriana* Gottsche –Zhu and So (2000c), Zhu and So (2001), present study.
- * *L. obscura* Mitt. –present study.
- * *L. pallide-virens* S. Hatt. –present study.
- L. parva* (S. Hatt.) Mizut. –Zhang and Lai (1993), Gao and Cao (2000), Zhu and So (2001), Zhu *et al.* (2001), Gao and Lai (2003), present study.
- L. punctiformis* Taylor –Wu and Luo (1978), Wu *et al.* (1984 as *Microlejeunea punctiformis*), Piippo (1990 as *L. ulicina*), Li and Wu (1993 as *Microlejeunea punctiformis*), Zhu and So (2001), Gao and Lai (2003), present study.
- L. ulicina* (Taylor) Gottsche *et al.* –Zhang and Lai (1993), Zhu and Hu (1993), He (1997b as *M. ulicina*), present study.
- * *L. wightii* Lindenb. –present study.
- Lepidozia fauriana* Steph. –Mizutani and Chang (1986), Piippo (1990), Li (1994), Gao and Cao (2000), Gao and Bai (2002), Gao (2003), Gao and Lai (2003), present study.
- L. reptans* (L.) Dumort. –Mizutani and Chang (1986), Piippo (1990), Li and Wu (1993), Li (1994), Zhang and Lai (1993), Gao and Bai (2002), Gao (2003), Gao and Lai (2003), present study.
- L. vitrea* Steph. –Li and Wu (1993), Zhang and Lai (1993), Gao and Cao (2000), Gao and Bai (2002), Gao (2003), Gao and Lai (2003), present study.
- * *Leptolejeunea balansae* Steph. –present study.
- L. elliptica* (Lehm. & Lindenb.) Schiffn. –Chen and Wu (1964 as *Leptolejeunea sabacuta*), Wu and Luo (1978), Li

- (1985), Wu *et al.* (1983), Wu *et al.* (1987a), Piippo (1990), Zhang and Lai (1993), Zhu and Hu (1993), Li (1994), He (1997b), But *et al.* (2000), Zhu and So (2001), Zhu *et al.* (2001), present study.
- * *Liochlaena subulata* (A. Evans) Schljakov –present study.
- Lopholejeunea nigricans* (Lindenb.) Schiffn. –Zhu and So (2001), Zhu and Gradstein (2005), present study.
- L. soae* R. L. Zhu & Gradst. –Zhu and Gradstein (2005), present study.
- L. subfusca* (Nees) Schiffn. –Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), He (1997b), Gao and Cao (2000), Zhu and So (2001), Gao and Lai (2003), Zhu and Gradstein (2005), present study.
- * *L. zollingeri* (Steph.) Schiffn. –present study.
- Makinoa crispata* (Steph.) Miyake –Li and Wu (1993), Zhang and Lai (1993), Li (1994).
- Marchantia emarginata* Reinw. *et al.* subsp. *emarginata* –Chao (1943 as *Marchantia palmata*)
- M. emarginata* Reinw. *et al.* subsp. *tosana* (Steph.) Bischl. –Li and Wu (1993 as *Marchantia tosana*), Zhang and Lai (1993), Li (1994), Zhang and Wu (2006 as *M. tosana*).
- M. paleacea* Bertol. subsp. *diptera* (Nees & Mont.) Inoue –Li and Wu (1993 as *Marchantia diptera*), Zhang and Lai (1993 as *M. paleacea* var. *diptera*), Li (1994), present study.
- M. paleacea* Bertol. subsp. *paleacea* –Chao (1943 as *Marchantia nepalensis*), Chao (1943 as *M. camfissa* [sic]).
- M. polymorpha* L. –Li (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), present study.
- Marsupella alpina* (Gottsche ex Husn.) Bernet –Wu *et al.* (1984), Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Gao and Cao (2000), Gao and Lai (2003), Gao and Wu (2008), present study.
- M. emarginata* (Ehrh.) Dumort. –Li (1994 as *Marsupella emarginata* subsp. *tubulosa*), Gao and Wu (2008), present study.
- * *M. pseudofuncikii* S. Hatt. –present study.
- M. yakushimensis* (Horik.) S. Hatt. –Li and Wu (1993), Zhang and Lai (1993), present study.
- * *Mastigolejeunea indica* Steph. –present study.
- * *M. repleta* (Taylor) A. Evans –present study.
- Megaceros flagellaris* (Mitt.) Steph. –Li *et al.* (1986 as *Megaceros tosanus*), Piippo (1990), Li and Wu (1993 as *M. tosanus*), Zhang and Lai (1993), Zhang and Wu (2006).
- Metacalypogeia cordifolia* (Steph.) Inoue –Zhang and Lai (1993).
- Metzgeria conjugata* Lindb. –Wu *et al.* (1983), Li (1985), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), present study.
- * *M. consanguinea* Schiffn. –present study.
- M. furcata* (L.) Dumort. –Li (1994), Zhang and Wu (2006), present study.
- M. lindbergii* Schiffn. –Li (1994), present study.
- M. pubescens* (Schrank) Raddi –Wu *et al.* (1984 as *Apometzgeria pubescens*), Li (1985), Piippo (1990 as *A. pubescens*), Li and Wu (1993 as *A. pubescens*), Zhang and Lai (1993 as *A. pubescens*), present study.
- Mylia verrucosa* Lindb. subsp. *nuda* (Inoue & B. Y. Yang) Potemkin & Kazanovsky –Gao and Bai (2001 as *Mylia nuda*), Gao (2003 as *M. nuda*).
- Nardia assamica* (Mitt.) Amakawa –Gao and Cao (2000), Gao and Bai (2001), Gao (2003), Gao and Lai (2003), Váňa *et al.* (2005), present study.
- N. scalaris* Gray subsp. *harae* (Amakawa) Amakawa –Li (1994).
- Neotrichocolea bissetii* (Mitt.) S. Hatt. –Zhang and Lai (1993), Cao *et al.* (2000), Gao and Cao (2000), Gao and Lai (2003), Cao *et al.* (2006a), Cao *et al.* (2006b), Cao *et al.* (2007), Gao and Wu (2008).
- Notoscyphus lutescens* (Lehm. & Lindenb.) Mitt. –Chao (1943 as *Odontoschisma speciosum*), Li and Wu (1993 as *Notoscyphus paroicus*), Zhang and Lai (1993), Li (1994), Gao *et al.* (1999), Gao and Cao (2000), Gao and Bai (2001), Gao (2003), Gao and Lai (2003), Váňa *et al.* (2005), Zhang and Wu (2006), present study.
- Nowellia aciliata* (P. C. Chen & P. C. Wu) Mizut. –Li and Wu (1993 as *Nowellia curvifolia* var. *aciliata*), Cao *et al.*

- (2006a), Cao *et al.* (2006b), Cao *et al.* (2007), present study.
- N. curvifolia* (Dicks.) Mitt. –Wu *et al.* (1982 as *Nowellia curvifolia* var. *aciliata*), Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Gao (2003), present study.
- Odontoschisma denudatum* (Mart.) Dumort. –Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Yi and Gao (2001), Zhu and So (2001), Zhu *et al.* (2001), Gao (2003), Gao and Lai (2003 as *Odontoschisma denudatum*), present study.
- * *O. grosseverrucosum* Steph. –present study.
- Otolejeunea semperiana* (Gottsche ex Steph.) Grolle –Zhu and So (1997), He (1997a), Zhu and So (1998b), Zhu and So (2001).
- * *Pallavicinia ambigua* (Mitt.) Steph. –present study.
- * *P. levieri* Schiffn. –present study.
- P. lyellii* (Hook.) Carruth. –Chao (1943), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Zhang and Wu (2006).
- P. subciliata* (Austin) Steph. –Chao (1943 as *Pallavicinia longispina*), Li and Wu (1993 as *P. longispina*), Zhang and Lai (1993), Li (1994), present study.
- Pellia endiviifolia* (Dicks.) Dumort. –Li and Wu (1993 as *Pellia endivaefolia*), Zhang and Lai (1993 as *P. endivaefolia*), Li (1994 as *P. endivaefolia*).
- P. epiphylla* (L.) Corda –Zhang and Lai (1993), present study.
- * *Phaeoceros carolinianus* (Michx.) Prosk. –present study.
- P. laevis* (L.) Prosk. –Chao (1943 as *Anthoceros laevis*), Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), So (1995).
- Plagiochasma appendiculatum* Lehm. & Lindenb. –Zhang and Lai (1993).
- P. cordatum* Lehm. & Lindenb. –Chao (1943 as *Plagiochasma fissisquamum*), Zhang and Lai (1993).
- P. intermedium* Lindenb. & Gottsche –Zhang and Lai (1993).
- P. pterospermum* C. Massal. –Li (1994).
- P. rupestre* (J. R. Forst. & G. Forst.) Steph. –Li and Wu (1993), Zhang and Lai (1993), present study.
- Plagiochila arbuscula* (Brid. ex Lehm. & Lindenb.) Lindenb. –So (2001a).
- P. chinensis* Steph. –So (2001a), So and Grolle (2000), present study.
- P. corticola* Steph. –So (2001a), Gao and Wu (2008).
- P. durelii* subsp. *durelii* Schiffn. –Grolle and So (1999b), So (2001a), Gao and Wu (2008).
- P. flexuosa* Mitt. –So (2001a), Gao and Wu (2008), present study.
- P. fordiana* Steph. –So (2001a), Gao and Wu (2008).
- P. fruticosa* Mitt. –So (2001a), Gao and Wu (2008).
- P. furcifolia* Mitt. –So (2001a), Zhu and So (2001), Gao and Wu (2008).
- P. gracilis* Lindenb. & Gottsche –Zhang and Lai (1993).
- P. gymnoclada* Sande Lac. –So and Grolle (2000), So (2001a), Zhu and So (2003), Gao and Wu (2008), present study.
- * *P. hakkodensis* Steph. –present study.
- P. junghuhniana* Sande Lac. –So (2001a), So and Grolle (1999), Grolle and So (1999a as *Plagiochila massalongana*), Gao and Wu (2008), present study.
- * *P. khasiana* Mitt. –present study.
- P. nepalensis* Lindenb. –So (2001a), Zhu and So (2001).
- P. ovalifolia* Mitt. –Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), So and Grolle (2000), So (2001a), present study.
- P. parvifolia* Lindenb. –So (2001a), Gao and Wu (2008), present study.
- P. peculiaris* Schiffn. –So (2001a), Gao and Wu (2008), present study.

- P. perserrata* Herzog –So (2001a), Gao and Wu (2008).
- P. pulcherrima* Horik. –So (2001a), Gao and Wu (2008), present study.
- P. sciophila* Nees ex Lindenb. –Carl (1931 as *Plagiochila euryphyllon*), Bonner (1962 as *P. euryphyllon*), Inoue (1962 as *P. euryphyllon*), Schuster (1980 as *P. euryphyllon*), Chao (1943 as *P. japonica*), Piippo (1990), Piippo (1990 as *P. euryphyllon*), Li and Wu (1993 as *P. acanthophylla* and *P. japonica*), Zhang and Lai (1993), Li (1994), So and Grolle (1999), So (2001a), Zhu and So (2001), Gao and Wu (2008), present study.
- P. semidecurrens* (Lehm. & Lindenb.) Lindenb. –Wu *et al.* (1984), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), So and Grolle (1999), So (2001a), Zhang and Wu (2006), Gao and Wu (2008), present study.
- P. trabeculata* Steph. –Li (1994), So (2001a), So (2001b), Gao and Wu (2008), present study.
- P. vexans* Schiffn. ex Steph. –So (2001a), So and Grolle (2001), Gao and Wu (2008), present study.
- Plagiochilium mayebarae* S. Hatt. –Li (1994), present study.
- P. theriotanum* (Steph.) Inoue –Li and Wu (1993), present study.
- Pleurozia subinflata* (Austin) Austin –Li *et al.* (1986 as *Pleurozia giganteoides*), Piippo (1990 as *Eopleurozia giganteoides*), Li and Wu (1993 as *P. giganteoides*), Zhang and Lai (1993 as *E. giganteoides*), present study.
- Plicanthus birmensis* (Steph.) R. M. Schust. –Li *et al.* (1986 as *Chandonanthus birmensis*), Piippo (1990 as *C. birmensis*), Li and Wu (1993 as *C. birmensis*), Zhang and Lai (1993 as *C. birmensis*), Li (1994 as *C. birmensis*), Gao and Cao (2000 as *C. birmensis*), Gao and Lai (2003 as *C. birmensis*), Gao and Wu (2008 as *C. birmensis*), present study.
- P. hirtellus* (F. Weber) R. M. Schust. –Li *et al.* (1986 as *Chandonanthus hirtellus*), Piippo (1990 as *C. hirtellus*), Li and Wu (1993 as *C. hirtellus*), Zhang and Lai (1993 as *C. hirtellus*), Li (1994 as *C. hirtellus*), Gao and Wu (2008 as *C. hirtellus*), present study.
- Porella acutifolia* (Lehm. & Lindenb.) Trevis. subsp. *acutifolia* –Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Gao and Cao (2000), Gao and Lai (2003), present study.
- P. acutifolia* (Lehm. & Lindenb.) Trevis. subsp. *tosana* (Steph.) S. Hatt. –Li (1994 as *Porella campylophylla* subsp. *tosana*), present study.
- P. caespitans* (Steph.) S. Hatt. var. *nipponica* S. Hatt. –Li (1994), present study.
- P. campylophylla* (Lehm. & Lindenb.) Trevis. –Li (1994 as *Porella campylophylla* subsp. *campylophylla*).
- P. densifolia* (Steph.) S. Hatt. subsp. *densifolia* –Li (1985), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Gao and Lai (2003).
- P. densifolia* (Steph.) S. Hatt. var. *appendiculata* (Steph.) S. Hatt. –Li (1985), Piippo (1990), Gao and Cao (2000), Gao and Lai (2003), present study.
- * *P. oblongifolia* S. Hatt. –present study.
- P. obtusata* (Taylor) Trevis. var. *macroloba* (Steph.) S. Hatt. & M. X. Zhang –Li (1985 as *Porella macroloba*), Piippo (1990), Gao and Cao (2000), Gao and Lai (2003), present study.
- * *P. obtusiloba* S. Hatt. –present study.
- P. perrottetiana* (Mont.) Trevis. var. *ciliatodentata* (P. C. Chen & P. C. Wu) S. Hatt. –Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), present study.
- P. perrottetiana* (Mont.) Trevis. var. *perrottetiana* –Li (1985), Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Li (1994), Gao and Cao (2000), Gao and Lai (2003), present study.
- P. pinnata* L. –Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Gao and Cao (2000), Gao and Lai (2003).
- P. platyphylla* (L.) Pfeiff. –Li and Wu (1993).
- P. ulophylla* (Steph.) S. Hatt. –Li and Wu (1993 as *Macvicaria ulophylla*), Zhang and Lai (1993 as *M. ulophylla*), present study.
- P. vernicosa* Lindb. –Li and Wu (1993), Zhang and Lai (1993).

- Ptychanthus striatus* (Lehm. & Lindenb.) Nees –Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), He (1997b), Zhu and So (2001), Zhang and Wu (2006), present study.
- Radula acuminata* Steph. –Chen and Wu (1964), Yamada (1982), Wu *et al.* (1983), Wu *et al.* (1987a), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Zhu and So (2001), Zhu *et al.* (2001), Gao and Lai (2003), Gao and Wu (2008), present study.
- R. acuta* Mitt. –Gao and Wu (2008), present study.
- R. amoena* Herzog –Gao and Wu (2008).
- R. assamica* Steph. –Gao and Wu (2008).
- R. borneensis* Steph. –Gao and Wu (2008).
- R. caduca* K. Yamada –Gao and Wu (2008).
- R. cavifolia* Hampe ex Gottsche *et al.* –Wu *et al.* (1983), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Zhu and So (2001), Gao and Wu (2008), present study.
- R. complanata* (L.) Dumort. –Chao (1943), Li and Wu (1993), Zhang and Lai (1993), Gao and Wu (2008).
- R. constricta* Steph. –Zhang and Lai (1993), present study.
- * *R. gedena* Gottsche ex Steph. –present study.
- R. japonica* Gottsche ex Steph. –Li and Wu (1993), Zhang and Lai (1993), Li (1994), present study.
- R. javanica* Gottsche –Zhu and So (2001), Gao and Wu (2008), present study.
- R. kojana* Steph. –Li and Wu (1993), Zhang and Lai (1993), Li (1994), Zhu and So (2001), present study.
- R. lindenberghiana* Gottsche ex C. Hartm. –Chao (1943 as *Radula lindbenbergiana* [sic]), Gao and Wu (2008).
- R. madagascariensis* Gottsche –Gao and Wu (2008).
- R. okamurana* Steph. –Gao and Wu (2008), present study.
- R. oyamensis* Steph. –Yamada (1982), Piippo (1990), So and Zhu (1996a), Zhu and So (2001), present study.
- R. perrottetii* Gottsche ex Steph. –Li (1994), Gao and Wu (2008), present study.
- R. reflexa* Nees & Mont. –Gao and Wu (2008).
- R. retroflexa* Taylor –Gao and Wu (2008), present study.
- R. stellatogemmipara* C. Gao & Y. H. Wu –Gao and Wu (2005), Gao and Wu (2008), present study.
- R. tjibodensis* K. I. Goebel –Gao and Wu (2008).
- * *R. tokiensis* Steph. –present study.
- Reboulia hemisphaerica* (L.) Raddi –Chao (1943), Li and Wu (1993), Zhang and Lai (1993).
- Riccardia chamedryfolia* (With.) Grolle –Chao (1943 as *Aneura sinuata*), Li (1994).
- * *R. latifrons* (Lindb.) Lindb. –present study.
- R. multifida* (L.) Gray –Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), present study.
- R. palmata* (Hedw.) Carruth. –Chao (1943), Gao and Chang (1981), Piippo (1990), Zhang and Lai (1993), Gao and Cao (2000), Gao and Lai (2003), present study.
- Riccia fluitans* L. –Chao (1943), Piippo (1990), Gao and Chang (1981), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Gao and Cao (2000), Gao and Lai (2003), Zhang and Wu (2006), present study.
- R. glauca* L. –Li and Wu (1993), Zhang and Lai (1993).
- Ricciocarpos natans* (L.) Corda –Chao (1943 as *Ricciocarpos natans*), Gao and Chang (1981), Piippo (1990), Gao and Cao (2000), Gao and Lai (2003 as *R. natans*), present study.
- Saccogynidium rigidulum* (Nees) Grolle –Gao and Wu (2008), present study.
- Scapania bolanderi* Austin –Li and Wu (1993 as *Scapania bolanderi* [sic]), Zhu *et al.* (2006).
- S. ciliata* Sande Lac. –Li *et al.* (1986), Piippo (1990), Li and Wu (1993 as *Scapania cifiata* [sic]), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Gao and Wu (2008), present study.
- * *S. curta* (Mart.) Dumort. –present study.
- S. ferruginea* (Lehm. & Lindenb.) Gottsche –Zhang and Lai (1993).

- S. kaponenii* Potemkin –Potemkin (2000), Gao and Wu (2008), present study.
- S. ligulata* subsp. *stephanii* (Müll. Frib.) Potemkin –Wu *et al.* (1983 as *Scapania stephanii*), Wu *et al.* (1984 as *S. stephanii*), Li *et al.* (1986 as *S. stephanii*), Piippo (1990 as *S. stephanii*), Zhang and Lai (1993 as *S. stephanii*), Li (1994 as *S. stephanii*), Gao and Cao (2000 as *S. stephanii*), Potemkin *et al.* (2004), Gao and Wu (2008 as *S. stephanii*).
- S. ornithopodioides* (With.) Waddell –Zhang and Lai (1993), Gao and Cao (2000).
- S. parvitexta* Steph. –Li (1994 as *Scapania parvidens*), Li (1994), Gao and Cao (2000), Gao and Wu (2008).
- * *S. subnimbosa* Steph. –present study.
- S. uliginosa* (Sw. ex Lindenb.) Dumort. –Li and Wu (1993 as *Scapania uligihosa* [sic]).
- * *S. umbrosa* (Schrader) Dumort. –present study.
- S. undulata* (L.) Dumort. –Li and Wu (1993), Gao and Wu (2008).
- S. verrucosa* Heeg –Gao and Cao (2000), Li and Wu (1993 as *Scapania spinosa*), Gao and Wu (2008), present study.
- Schiffneria hyalina* Steph. –Li and Wu (1993), Li (1994), Ji *et al.* (1998), Long (2005), Li *et al.* (2006).
- Solenostoma comatum* (Nees) C. Gao –Gao and Cao (2000 as *Jungermannia comata*), Gao and Bai (2001 as *J. comata*), Gao (2003 as *J. comata*), Váňa *et al.* (2005 as *J. comata*), present study.
- S. erectum* (Amakawa) C. Gao –Gao and Bai (2001 as *Jungermannia erecta*), Gao (2003 as *J. erecta*), present study.
- S. hasskarlianum* (Nees) R. M. Schust. ex Váňa & D. G. Long –Gao and Bai (2001 as *Jungermannia hasskarliana*), Gao (2003 as *J. hasskarliana*), Gao and Lai (2003 as *J. hasskarliana*).
- S. hyalina* (Lydell) Mitt. –Gao and Cao (2000 as *Jungermannia hyalina*), Gao and Bai (2001 as *J. hyalina*), Gao (2003 as *J. hyalina*), Gao and Lai (2003 as *J. hyalina*).
- S. lixingjiangii* (C. Gao & X. L. Bai) Váňa & D. G. Long –Gao and Cao (2000 as *Jungermannia lixingjiangii*), Gao and Bai (2001 as *J. lixingjiangii*), Gao (2003 as *J. lixingjiangii*), Gao and Lai (2003 as *J. lixingjiangii*), Cao *et al.* (2006b as *J. lixingjiangii*), Cao *et al.* (2007 as *J. lixingjiangii*).
- S. obovatum* (Nees) R. M. Schust. –Zhang and Lai (1993 as *Jungermannia obovata*).
- S. parviprianthum* (C. Gao & X. L. Bai) Váňa *et al.* –Gao and Bai (2001 as *Jungermannia parvipriantha*), Gao (2003 as *J. parvipriantha*), Gao and Lai (2003 as *J. parvipriantha*).
- S. plagiochilaceum* (Grolle) Váňa & D. G. Long –Gao and Cao (2000 as *Jungermannia plagiochiloides*), Gao and Bai (2001 as *J. plagiochiloides*), Gao (2003 as *J. plagiochiloides*), Gao and Lai (2003 as *J. plagiochiloides*).
- S. rubripunctatum* (S. Hatt.) R. M. Schust. –Gao and Cao (2000 as *Jungermannia rubripunctata*), Gao and Bai (2001 as *J. rubripunctata*), Gao (2003 as *J. rubripunctata*), Gao and Lai (2003 as *J. rubripunctata*), Váňa *et al.* (2005 as *J. rubripunctata*).
- S. sikkimense* (Schiffn. ex Steph.) Váňa & D. G. Long –Gao and Cao (2000 as *Jungermannia sikkimensis*), Gao and Bai (2001 as *J. sikkimensis*), Gao (2003 as *J. sikkimensis*), Gao and Lai (2003 as *J. sikkimensis*).
- S. sphaerocarpum* (Hook.) Steph. –Gao and Cao (2000 as *Jungermannia sphaerocarpa*), Gao and Bai (2001 as *J. sphaerocarpa*), Gao (2003 as *J. sphaerocarpa*), Gao and Lai (2003 as *J. sphaerocarpa*).
- * *S. tetragonum* (Lindenb.) R. M. Schust. ex Váňa & D. G. Long –present study.
- S. torticalyx* (Steph.) C. Gao –Gao and Cao (2000 as *J. torticalyx*), Gao and Bai (2001 as *J. torticalyx*), Gao (2003 as *J. torticalyx*), Gao and Lai (2003 as *J. torticalyx*).
- S. truncatum* (Nees) R. M. Schust. ex Váňa & D. G. Long –Chao (1943 as *Eucalyx boninensis*), Gao and Bai (2001 as *Jungermannia truncata*), Gao (2003 as *J. truncata*), Gao and Lai (2003 as *J. truncata*), Váňa *et al.* (2005 as *J. truncata*), present study.
- * *Spruceanthus polymorphus* (Sande Lac.) Verd. –present study.
- S. semirepandus* (Nees) Verd. –Verdoorn (1934), Wu *et al.* (1983), Li *et al.* (1986), Piippo (1990), Zhang and Lai (1993), Li and Wu (1993), Li (1994), He (1997b), Zhu and So (2001), Zhang and Wu (2006), present study.
- Syzygiella autumnalis* (DC.) K. Feldberg *et al.* –Li and Wu (1993 as *Jamesoniella autumnalis*), Zhang and Lai (1993

as *J. autumnalis*), Li (1994 as *J. autumnalis*), Zhu and So (2001 as *J. autumnalis*).

* *S. nipponica* (S. Hatt.) K. Feldberg *et al.* –present study.

* *Telaranea wallichiana* (Gottsche) R. M. Schust. –present study.

Thysananthus flavescens (S. Hatt.) Gradst. –Zhang and Lai (1993 as *Mastigolejeunea flavescens*), present study.

* *T. spathulistipus* (Reinw. *et al.*) Lindenb. –present study.

Trichocolea merrillana Steph. –Zhang and Lai (1993).

T. tomentella (Ehrh.) Dumort. –Wu *et al.* (1984), Piippo (1990), Li and Wu (1993), Li and Wu (1993 as *Trichocolea phuma* [sic]), Zhang and Lai (1993), Gao (2003), Gao and Lai (2003), present study.

Trichocoleopsis sacculata (Mitt.) S. Okamura –Wu *et al.* (1984), Wu *et al.* (1987c), Piippo (1990), Zhang and Lai (1993), Cao *et al.* (2000), Gao and Cao (2000), Gao and Lai (2003).

T. tsinlingensis P. C. Chen ex M. X. Zhang –Li and Wu (1993), Zhang and Lai (1993), Gao and Cao (2000), Gao and Lai (2003), Cao *et al.* (2006a), Cao *et al.* (2006b), Cao *et al.* (2007).

Trimotaria exsecta (Schmidel ex Schrad.) Schiffn. ex Loeske –Zhang and Lai (1993).

Trocholejeunea sandvicensis (Gottsche) Mizut. –Li *et al.* (1986), Piippo (1990), Li and Wu (1993), Zhang and Lai (1993), Li (1994), Gao and Cao (2000), Zhu and So (2001), Zhang and Wu (2006), present study.

Tuyamaella molischii (Schiffn.) S. Hatt. var. *molischii* –Zhu and So (2000a), Zhu and So (2001), present study.

Wiesnerella denudata (Mitt.) Steph. –Li (1994), Zhang and Wu (2006).

Doubtful species

Cheilolejeunea fukiensis (P. C. Chen & P. C. Wu) Piippo –Chen and Wu (1964), Wu *et al.* (1983 as *Euosmolejeunea fukiensis*), Piippo (1990), Li and Wu (1993 as *E. fukiensis*), Zhang and Lai (1993), He (1997b).

This species is poorly known, because several key characters were not described and illustrated in the protologue. Fresh and fertile material at the locality of the type were searched and field collection revealed that *C. fukiensis* may be a form of *Lejeunea flava* (Zhu and So, 2001).

3 Discussion

3.1 Liverwort and hornwort flora

As with the whole of flora of liverworts and hornworts of China (Piippo, 1992), those tropical and subtropical families, such as Lejeuneaceae, Frullaniaceae, Plagiochilaceae and Lepidoziaceae also have obvious predominance in the liverwort and hornwort flora of Fujian. On the other hand, there are a huge number of monospecific genera which indicate the complexity and specificity of genera comprising Fujian liverworts and hornworts. It also confirms that with less influence from the Glacial age of

the Quaternary period, Fujian acts as a refuge of those relic species (Huang and Zha, 2003).

In comparison with Taiwan, our results on the liverwort and hornwort flora do not agree with the situation in terms of vascular plants. According to Huang and Zha's (2003) comparison of vascular plants between Fujian and Taiwan, Fujian possesses an obviously richer diversity of vascular plants at the familial, generic and specific level. However, Taiwan with its smaller size possesses much richer diversity of liverworts and hornworts than Fujian. This completely opposite situation regarding on liverworts and hornworts might probably be explained by the fact that with the northern half of the province located in the subtropics and the southern half located in the tropics, Taiwan possesses more diverse vegetation and a moister climate (Cai and Xu, 2002) which are more favourable for the growth of liverworts and hornworts. The peculiar topography of Taiwan with many high mountains also favors a richer diversity of liverworts and hornworts. In addition, incomplete investigation of liverwort and hornwort flora of Fujian might be another important factor that affects our knowledge of liverwort and hornwort flora. It therefore indicates that further and more detailed investigations of this province is still in need.

3.2 Phytogeographical aspects and bryofloristic affinities

The large number of East Asiatic distribution species shows that Fujian harbors a close relationship with Japanese and Himalayan bryoflora. According to Wu and Jia (2006), Eastern China is one of the centers of East Asiatic distribution bryophytes of China. Although the lack of more detailed data on distribution patterns of Taiwan hepatic flora does not allow us to make more precise analyses of the phytogeographical relationship between these two regions, Fujian surely is still a significant node for further research on East Asiatic hepatic diversity.

Concerning the bryofloristic affinities, the comparison between Fujian and Taiwan shows a close relationship between liverworts and hornworts. Among the 260 shared species, eight species, *Bazzania magna*, *Cheilolejeunea chenii*, *Frullania osu-miensis*, *Frullania acutiloba* var. *schiffneri*, *Kurzia pauciflora*, *Lopholejeunea zollingeri*, *Saccogynidium rigidulum*, and *Thysananthus spathulistipus* are distributed only in Fujian and Taiwan within China. Moreover, among these eight species, *Bazzania magna* and *Cheilolejeunea chenii* are endemic to China. This reveals that the joint preservation of these two provinces will be more efficient for these species. Further more, the Kroeber's percentage of generic similarity of Fujian and Taiwan is 78.69% which is much higher than that of Taiwan with Philippines (73.2%) and Hainan Island (75.1%) (Wang *et al.*, 2011). The closer affinity between Fujian and Taiwan can partially be explained by the fact that Taiwan was once connected with Fujian the mid-Pleistocene (Lai, 2003). The geographical origin of Taiwan (Zhao, 1982) means that the two locations share a mountainous topography which leads to the similar liverwort and hornwort flora. This relatively detailed investigation of Fujian province now also leads to a better understanding of the flora of liverworts and hornworts.

However, in spite of the close affinity, there are still some striking differences between liverworts and

hornworts in these two regions, especially in terms of endemism. In comparison with Taiwan (Wang *et al.*, 2011), the fewer number of species endemic to Fujian might possibly be caused by the particular topography with many high mountains (with 62 mountains over 3 000 m above the sea level) and the favourable climate in Taiwan (Cai and Xu, 2002) for bryophytes. Meanwhile, the geographical barrier caused by the evolution of the topography of Taiwan that accelerates the differentiation of species and communities (Cai and Xu, 2002) might also contribute to the high endemism.

Unexpectedly, another remarkable difference is that a lot of genera that are widely distributed in Japan (Yamada and Iwatsuki, 2006) and Taiwan (Wang *et al.*, 2011) are absent in Fujian, such as *Anastrepta*, *Barbilophozia*, *Cyathodium*, *Gymnomitrium*, *Lophocolea*, *Lophozia*, *Lunularia*, *Schistochila*, *Targionia*, *Xenochila*, *Zoopsis*, *Dendroceros* and *Notothylas*, etc. Their absence might be due to insufficient collection and mis-identification. Moreover, in comparison with numerous high mountains (over 3 000 m) in Taiwan, there are very few high mountains in Fujian, most of which are located in the northwestern part. Most of the eastern and southern parts of Fujian which are nearer to Taiwan are lowlands and are affected by much more human activities. In addition, most of the bryofloristic studies in Fujian have been confined to Mt. Wuyi in the northwestern part, which indicates that a more detailed investigation throughout the province will undoubtedly increase the known number of species.

Acknowledgements: We thank the staff of the Daiyunshan National Nature Reserve, Fujian, China, and You-Fang Wang, Jian Wang, Tao Peng, Yu-Mei Wei, Xia-Fang Cheng, Qiong He, Ying Yu and Yuan Fang of the East China Normal University for field assistance.

References:

- Balgooy MMJ van, 1971. Plant geography of the Pacific as based on the distribution of phanerogam genera [J]. *Blumea*, Supplement, 6: 1—222

- Bartram EB, 1935. Additions to the moss flora of China [J]. *Annales Bryologici*, **8**: 6—21
- Bonner CEB, 1962. Index Hepaticarum I. *Plagiochila* (Dum.) Dum [M]. Weinheim: J. Cramer
- But PPH (毕培羲), Wu PC (吴鹏程), Wang MZ (汪楣芝), 2000. Epiphyllous liverworts on rosette leaves of *Ardisia* species (Myrsinaceae) in China [J]. *Tropical Bryology*, **19**: 27—30
- Cai F (蔡飞), Xu GS (徐国土), 2002. Distributions of Plant biodiversity and it's characteristics in Taiwan [J]. *Journal of Zhejiang University* (Science Edition) (浙江大学学报 (理学版)), **29** (2): 184—189
- Cao T (曹同), Sha W (沙伟), Yu J (于晶) *et al.*, 2000. Biodiversity and conservation of bryophytes in China [A]. In: Chou YS, Hriech FR, Wu SH *et al.*, eds. Proceedings of the 2000's Cross-strait Symposium on Biodiversity and Conservation [M]. Taichung: National Museum of Natural Science, 317—329
- Cao T (曹同), Zhu RL (朱瑞良), Guo SL (郭水良) *et al.*, 2006b. A brief report of the first red list of endangered bryophytes in China [J]. *Bulletin of Botanical Research* (植物研究), **26** (6): 756—762
- Cao T (曹同), Zhu RL (朱瑞良), Guo SL (郭水良) *et al.*, 2007. A brief report of the first red list of endangered bryophytes in China [J]. *Endangered Species Scientific Newsletter* (濒危物种科学通讯), (1): 19—26
- Cao T (曹同), Zhu RL (朱瑞良), Tan BC *et al.*, 2006a. A report of the first national red list of Chinese endangered bryophytes [J]. *Journal of the Hattori Botanical Laboratory*, **99**: 275—295
- Carl H, 1931. Die Arttypen und die systematische Gliederung der Gattung *Plagiochila* Dum [J]. *Annales Bryologici*, Supplement, **2**: 1—170
- Chao HC (赵修谦), 1943. Studies on the Hepaticae of Fukien [J]. *Collected Papers, National University of Amoy*, **1**: 101—144
- Chen PC (陈邦杰), Wu PC (吴鹏程), 1964. Studies on the epiphyllous liverworts of China. I [J]. *Acta Phytotaxonomica Sinica* (植物分类学报), **9** (3): 213—276
- Crandall-Stotler B, Stotler RE, Long DG, 2009. Phylogeny and classification of the Marchantiophyta [J]. *Edinburgh Journal of Botany*, **66**: 155—198
- Feldberg K, Váña J, Hentschel J *et al.*, 2010. Currently accepted species and new combinations in Jamesonielloideae (Adelanthaceae, Jungermanniales) [J]. *Cryptogamie Bryologie*, **31** (2): 141—146
- Gao C (高谦), 2003. Flora Bryophytorum Sinicorum 9 [M]. Beijing: Science Press
- Gao C (高谦), Bai XL (白学良), 2001. A synoptic revision of family Jungermanniaceae (Hepaticae) in China including some taxa nova [J]. *The Philippine Scientist*, **38**: 111—170
- Gao C (高谦), Bai XL (白学良), 2002. *Lepidozia suyungii* (Lepidoziaceae, Hepaticae), a new species from southwestern China, with discussion of the species of *Lepidozia* in China [J]. *Journal of the Hattori Botanical Laboratory*, **92**: 191—197
- Gao C (高谦), Cao T (曹同), 2000. Flora Yunnanica 17 [M]. Beijing: Science Press
- Gao C (高谦), Jia XY (贾学乙), Cao T (曹同), 1999. A taxonomic study of *Notoscyphus* Mitt. (Hepaticae) in China [J]. *Bulletin of Botanical Research* (植物研究), **19** (4): 361—367
- Gao C (高谦), Lai MJ (赖明洲), 2003. Illustrations of Bryophytes of China [M]. Taipei: SMC Publishing Inc
- Gao C (高谦), Wu YH (吴玉环), 2005. *Radula stellatogemmipara* (Radulaceae, Hepaticae), a new species from Fujian and Guangxi, China [J]. *Nova Hedwigia*, **80** (1-2): 237—240
- Gao C (高谦), Wu YH (吴玉环), 2008. Flora Bryophytorum Sinicorum 10 [M]. Beijing: Science Press
- Gao CH (高彩华), Li DK (李登科), 1985. A preliminary study of Chinese Haplomitriaceae (Class Hepaticae) [J]. *Wuyi Science Journal* (武夷科学), **5**: 231—234
- Gao C (高谦), Chang KC (张光初), 1981. Flora hepaticarum Chinae boreali-orientalis [M]. Beijing: Science Press
- Gleason HA, 1922. On the relations between species and area [J]. *Ecology*, **3**: 158—162
- Grolle R, So ML (苏美灵), 1999a. Studies of *Plagiochila* sect. *Contiguae* in East and South Asia [J]. *Bryologist*, **102**: 294—303
- Grolle R, So ML (苏美灵), 1999b. On the *Plagiochila* species of sect. *Zonatae* with paraphyllia or mammillose stems (Hepaticae) [J]. *Systematic Botany*, **24** (3): 297—310
- Grolle R, Zhu RL (朱瑞良), 2000. A study of *Drepanolejeunea* subg. *Rhaphidolejeunea* (Herzog) Grolle & R. L. Zhu, stat. nov. (Hepaticae, Lejeuneaceae) in China with notes on its species elsewhere [J]. *Nova Hedwigia*, **70**: 373—395
- Hattori S, 1974. Notes on the Asiatic species of the genus *Frullania*, Hepaticae. V [J]. *Journal of the Hattori Botanical Laboratory*, **38**: 185—221
- Hattori S, Lin PJ (林邦娟), 1985. A preliminary study of Chinese *Frullania* flora [J]. *Journal of the Hattori Botanical Laboratory*, **59**: 123—169
- He XL (何小兰), 1997a. Type studies on *Pycnolejeunea* (Lejeuneaceae, Hepaticae), IV [J]. *Annales Botanici Fennici*, **34**: 65—74
- He XL (何小兰), 1997b. A review and checklist of the Lejeuneaceae in China [J]. *Abstracta Botanica*, **21**: 69—77
- Huang YX (黄义雄), Zha X (查轩), 2003. Characteristics and the issues of bio-safety for the plant biodiversity in Fujian [J]. *Chinese Journal of Ecology* (生态学杂志), **22** (6): 85—90
- Inoue H, 1961. Hepatics collected by Mr. K. Sawada in Formosa [J]. *Journal of Japanese Botany*, **36**: 184—188
- Inoue H, 1962. Contributions to the knowledge of the Plagiochilaceae of Southeastern Asia. 3. Studies in *Plagiochila sciophila-acanthophylla* Complex [J]. *Journal of the Hattori Botanical Laboratory*

- ry, **25**: 91—101
- Ji MC (季梦成), Wang MZ (汪楣芝), Zhang ZY (张志勇) *et al.*, 1998. *Schiffneria* and its new distribution in China [J]. *Acta Botanica Yunnanica* (云南植物研究), **20** (2): 179—182
- Jin SY (靳淑英), 1994. A Catalogue of Type Specimens (Cormophyta) in the Herbaria of China [M]. Beijing: Science Press
- Konstantinova NA, Vilnet AA, 2009. New taxa and combinations in Jungermanniales [J]. *Arctoa*, **18**: 65—67
- Lai MJ (赖明洲), 2003. The Flora and Vegetation of Taiwan [M]. Taizhong: Morning Star Publishing Inc
- Li DK (李登科), 1990. Preliminary report [sic] on the epiphyllous liverworts in Human [sic] Province, China [J]. *Investigatio et Studium Naturae* (考察与研究), **10**: 137—138
- Li DK (李登科), 1997. Studies on the epiphyllous liverworts of Wanmulin Nature Reserve in Fujian Province, E China [J]. *Chenia* (隐花植物生物学), **3-4**: 63—68
- Li DK (李登科), Wu PC (吴鹏程), 1993. Investigation on lichens and bryophytes of Wiyushan Nature Reserve [A]. In: Zhao XF ed. Science Survey of Wiyishan Nature Reserve [M]. Fuzhou: Fujian Science and Technology Press, 131—149
- Li DK (李登科), Gao CH (高彩华), Wu PC (吴鹏程), 1986. A survey of the moss communities in the Wuyishan Natural Preserve, Fujian, China [J]. *Wuyi Science Journal* (武夷科学), **6**: 279—284
- Li XJ (黎兴江), 1985. Bryoflora of Xizang [M]. Beijing: Science Press
- Li ZY (李振宇), 1994. Plants of Longqi Mountain, Fujian, China [M]. Beijing: China Science and Technology Press
- Li W (李微), Gao C (高谦), Wu YH (吴玉环), 2006. Studies on the genus *Schiffneria* Steph. (Hepaticae) [J]. *Bulletin of Botanical Research* (植物研究), **26** (4): 389—391
- Long DG, 2005. Notes on Himalayan Hepaticae 2: New records and extensions of range for some Himalayan leafy liverworts [J]. *Cryptogamie Bryologie*, **26** (1): 97—107
- Mizutani M, Chang KC (张光初), 1986. A preliminary study of Chinese Lepidoziaceae flora [J]. *Journal of the Hattori Botanical Laboratory*, **60**: 419—439
- Piippo S, 1990. Annotated catalogue of Chinese Hepaticae and Anthocerotae [J]. *Journal of the Hattori Botanical Laboratory*, **68**: 1—192
- Piippo S, 1992. About the distribution and diversity of the Chinese Hepaticae and Anthocerotae [J]. *Bryobrothera*, **1**: 93—97
- Piippo S, 1996. Notes on Chinese Geocalycaceae (Hepaticae). 1 [J]. *Annales Botanici Fennici*, **33**: 45—49
- Potemkin A, Piippo S, Koponen T, 2004. Bryophyte flora of Hunan Province, China. 4. Diplophyllaceae and Scapaniaceae (Hepaticae) [J]. *Annales Botanici Fennici*, **41**: 415—427
- Potemkin AD, 2000. Bryophyte flora of Hunan Province, China 2. *Scapania koponenii* sp. nova (Scapaniaceae, Hepaticae) [J]. *Annales Botanici Fennici*, **37**: 41—44
- Ruan J (阮君), 2006. Biodiversity and valuation estimation of the forest of Fujian [J]. *Shandong Forestry Science and Technology* (山东林业科技), (1): 93—94
- Schuster RM, 1980. The Hepaticae and Anthocerotae of North America. IV [M]. New York: Columbia University Press
- Shi XQ (师雪琴), Zhu RL (朱瑞良), 2006. A range extension for *Haplomitrium mnioides* (Lindb.) R. M. Schust [J]. *Tropical Bryology*, **27**: 87—90
- So ML (苏美灵), 1995. Mosses and Liverworts of Hong Kong [M]. Hong Kong: Heavenly People Depot
- So ML (苏美灵), 2001a. *Plagiochila* (Hepaticae, Plagioclulaceae) in China [J]. *Systematic Botany Monographs*, **60**: 1—214
- So ML (苏美灵), 2001b. On *Plagiochila* section *Cobanae* Carl in Asia and Melanesia [J]. *Cryptogamie Bryologie*, **22** (3): 179—186
- So ML (苏美灵), Grolle R, 1999. Studies on *Plagiochila* in Asia: Supplements to sections *Abietinae*, *Annotinae*, *Ciliatae*, *Contiguae*, *Cucullatae*, *Poeltiae*, *Subtropicae* and *Zonatae* [J]. *Cryptogamie Bryologie*, **20** (3): 167—179
- So ML (苏美灵), Grolle R, 2000. Studies on *Plagiochila* sect. *Plagiochila* (Hepaticae) in East and South Asia [J]. *Journal of Bryology*, **22**: 17—28
- So ML (苏美灵), Grolle R, 2001. On several little-known species of *Plagiochila* (Hepaticae) in Asia [J]. *Journal of Bryology*, **23**: 123—132
- So ML (苏美灵), Zhu RL (朱瑞良), 1996a. Studies on Hong Kong hepatics II. Notes on some newly recorded liverworts from Hong Kong [J]. *Tropical Bryology*, **12**: 11—19
- So ML (苏美灵), Zhu RL (朱瑞良), 1996b. Studies on Hong Kong *Cheilolejeunea* with two species new to China [J]. *Tropical Bryology*, **12**: 5—10
- So ML (苏美灵), Zhu RL (朱瑞良), 1998. On six species of the genus *Lejeunea* in China, including one new species [J]. *The Bryologist*, **101** (1): 137—143
- Söderström L, De Roo R, Hedderson T, 2010. Taxonomic novelties resulting from recent reclassification of the Lophoziaaceae/Scapaniaceae clade [J]. *Phytotaxa*, **3**: 47—53
- Tan BC, Geissler P, Hallingback T *et al.*, 2000. The 2000 IUCN world red list of bryophytes [A]. In: Hallingbäck T, Hodgetts N eds. 2000. Mosses, Liverworts, and Hornworts: Status, Survey and Conservation Action Plan for Bryophytes [M]. UK: IUCN, Gland Switzerland and Cambridge, 77—90
- Thériot I, 1929. Le genre *Pseudoleskeopsis* [J]. *Annales de Cryptogamie Exotique*, **2**: 5—22
- Thériot I, 1932. Mousses de la Chine orientale [J]. *Annales de Cryptogamie Exotique*, **5**: 167—189
- Tixier P, 1978. Contributions à l'étude du genre *Cololejeunea* IV. Le sous-genre *Taeniolejeunea* (Zwickel) Benedix en Malaisie [J]. *Nova Hedwigia*, **29**: 1025—1042
- Váňa J, Hentschel J, Heinrichs J, 2010. New combinations in

- Jungermanniales; transfer of 32 taxa to *Solenostoma* Mitt [J]. *Cryptogamie Bryologie*, **31** (2): 135—139
- Váňa J, Piippo S, Koponen T, 2005. Bryophyte flora of Hunan Province, China. 6. Jungermanniaceae and Gymnomitriaceae [J]. *Acta Botanica Fennica*, **178**: 57—78
- Verdoorn F, 1930. Frullaniaceae [A]. In: Handel-Mazzetti H ed. *Symbolae Sinicae V (Hepaticae)* [M]. Wien: Julius Springer. 36—43
- Verdoorn F, 1934. Studien über asiatische Jubuleae (De Frullaniaceis XV-XVII) mit einer Einleitung Bryologie und Hepaticologie Ihre Methodik und Zukunft [J]. *Annales Bryologici*, Supplement, **4**: 1—231
- Wan BT (万本太), Xu HG (徐海根), Ding H (丁晖) *et al.*, 2007. Methodology of comprehensive biodiversity assessment [J]. *Biodiversity Science*, **15** (1): 97—106
- Wang J (王健), Lai MJ (赖明洲), Zhu RL (朱瑞良), 2011. Liverworts and hornworts of Taiwan: an updated checklist and floristic accounts [J]. *Annales Botanici Fennici* [In press]
- Wu PC (吴鹏程), Jia Y (贾渝), 2006. The regionalization and distribution types of the bryophytes in China [J]. *Journal of Plant Resources and Environment* (植物资源与环境学报), **15** (1): 1—8
- Wu PC (吴鹏程), Luo JS (罗健馨), 1978. Studies on the epiphyllous liverworts of China. II. The epiphyllous liverworts from Tibet [J]. *Acta Phytotaxonomica Sinica* (植物分类学报), **16** (4): 102—112
- Wu PC (吴鹏程), Li DK (李登科), Gao CH (高彩华), 1981. New records of bryophytes in Mt. Wuyi, China. I [J]. *Wuyi Science Journal* (武夷科学), **1**: 16—18
- Wu PC (吴鹏程), Li DK (李登科), Gao CH (高彩华), 1982. New records of bryophytes in Mt. Wuyi, China. II [J]. *Wuyi Science Journal* (武夷科学), **2**: 14—16
- Wu PC (吴鹏程), Li DK (李登科), Gao CH (高彩华), 1983. Studies on the epiphyllous liverworts of China. III. The epiphyllous liverworts on Wuyi Mountain [J]. *Wuyi Science Journal* (武夷科学), **3**: 1—6
- Wu PC (吴鹏程), Li DK (李登科), Gao CH (高彩华), 1984. A preliminary survey of bryophytes on coppice of *Buxus sinica* in Huanggan-shan, Wuyi Mountain [J]. *Wuyi Science Journal* (武夷科学), **4**: 9—11
- Wu PC (吴鹏程), Li DK (李登科), Gao CH (高彩华), 1987a. Preliminary measurment on some ecological factors of the epiphyllous liverworts in Mt. Wuyi [J]. *Acta Botanica Sinica* (植物学报), **29**: 449—452
- Wu PC (吴鹏程), Li DK (李登科), Gao CH (高彩华), 1987b. Light and epiphyllous liverworts in the subtropical evergreen forests of South-East China [J]. *Symposia Biologica Hungarica*, **35**: 27—32
- Wu PC (吴鹏程), Li DK (李登科), Gao CH (高彩华), 1987c. Relationships between the broflora of Mt. Wuyi, SE China, and those of neighbouring mountain regions [J]. *Acta Phytotaxonomica Sinica* (植物分类学报), **25**: 340—349
- Wu ZY (吴征镒), 1991. Areal types of seed plants in China [J]. *Acta Botanica Yunnanica* (云南植物研究), **IV**: 1—139
- Yamada K, 1982. Some new records on *Radula* collections from China [J]. *Miscellanea Bryologica et Lichenologica*, **9**: 129—131
- Yamada K, Iwatsuki Z, 2006. Catalog of the Hepatics of Japan [J]. *Journal of the Hattori Botanical Laboratory*, **99**: 1—106
- Yang F (杨芳), 2010. Analysis on the basic functions valuation assessment of forest ecosystems in Fujian Province [J]. *Environmental Science and Management* (环境科学与管理), **35** (2): 186—190
- Ye W (叶文), Zhu RL (朱瑞良), 2010. *Leucolejeunea*, a new synonym of *Cheilolejeunea* (Lejeuneaceae), with special reference to new combinations and nomenclature [J]. *Journal of Bryology*, **32** (4): 279—282
- Yi YJ (衣艳君), Gao C (高谦), 1998. The genus *Hattoria* of Jungermanniaceae new to China [J]. *Acta Phytotaxonomica Sinica* (植物分类学报), **36** (6): 555—557
- Yi YJ (衣艳君), Gao C (高谦), 2001. Study on the genus *Odontoschisma* [sic] in China [J]. *Journal of Nanjing Foestry University* (Natural Science) (南京林业大学学报 (自然科学版)), **25** (6): 45—47
- Zeng WB (曾文彬), 1983. The flora and phytogeographical subdivision of Fujian [J]. *Journal of Xiamen University* (Natural Science) (厦门大学学报 (自然科学版)), **22** (2): 217—226
- Zhang MZ (张美珍), Lai MJ (赖明洲), 1993. Checklist of plants of five provinces and one city in Eastern China [M]. Shanghai: Shanghai Popular Publishing House
- Zhang YL (张玉龙), Wu PC (吴鹏程), 2006. Spore Morphology of Chinese Bryophytes [M]. Qingdao: Qingdao Publishing House
- Zhao ZB (赵昭昞), 1982. The preliminary study of the evolution of Taiwan Strait [J]. *Taiwan Strait* (台湾海峡), **1** (1): 20—24
- Zhu J (朱俊), Wang YF (王幼芳), 2004. On several issues of East-Asiatic bryophytic immigration route by the characteristics of the bryoflora of Eastern Jiufeng Mt., Fujian, China [J]. *Journal of East China Normal University* (Natural Science) (华东师范大学学报 (自然科学版)), (3): 115—120
- Zhu J (朱俊), Wang YF (王幼芳), Zhu RL (朱瑞良) *et al.*, 2001. Epiphyllous liverworts of the Eastern Jiufeng Mountain, Fujian Province [J]. *Journal of East China Normal University* (Natural Science) (华东师范大学学报 (自然科学版)), (4): 96—102
- Zhu RL (朱瑞良), 1995. Notes on some species of the genus *Cololejeunea* (Lejeuneaceae, Hepaticae) in China [J]. *Journal of the Hattori Botanical Laboratory*, **78**: 83—109
- Zhu RL (朱瑞良), Gradstein SR, 2005. Monograph of *Lopholejeunea* (Lejeuneaceae, Hepaticae) in Asia [J]. *Systematic Botany Monographs*, **74**: 1—98

- Zhu RL (朱瑞良), Hu RL (胡人亮), 1993. Epiphyllous lejeuneaceous taxa from Daweishan Nature Reserve, Yunnan Province, China [J]. *Yushania*, **10**: 37—43
- Zhu RL (朱瑞良), Long DG, 2003. Lejeuneaceae (Hepaticae) from several recent collections from the Himalaya [J]. *Journal of the Hattori Botanical Laboratory*, **93**: 101—115
- Zhu RL (朱瑞良), So ML (苏美灵), 1997. A new record of the genus *Otolejeunea* (Hepaticae, Lejeuneaceae) in subtropical China [J]. *Annales Botanici Fennici*, **34**: 285—289
- Zhu RL (朱瑞良), So ML (苏美灵), 1998a. Reappraisal of *Cololejeunea ceratilobula*, *C. formosana*, and *C. reineckeana* (Hepaticae, Lejeuneaceae) [J]. *Taxon*, **47**: 839—842
- Zhu RL (朱瑞良), So ML (苏美灵), 1998b. A new species of *Otolejeunea* (Hepaticae, Lejeuneaceae) from the Philippines [J]. *Systematic Botany*, **23**: 231—234
- Zhu RL (朱瑞良), So ML (苏美灵), 1999a. New records of *Cololejeunea* (Lejeuneaceae, Hepaticae) for China and Vietnam [J]. *Botanical Bulletin of Academia Sinica*, **40**: 165—171
- Zhu RL (朱瑞良), So ML (苏美灵), 1999b. Additions of Lejeuneaceae taxa to the hepatic flora of Yunnan, China [J]. *Annales Botanici Fennici*, **36**: 219—229
- Zhu RL (朱瑞良), So ML (苏美灵), 1999c. The genus *Leucolejeunea* (Hepaticae, Lejeuneaceae) in China [J]. *Nova Hedwigia*, **68**: 225—232
- Zhu RL (朱瑞良), So ML (苏美灵), 2000a. The genus *Tuyamaella* (Hepaticae, Lejeuneaceae) in China [J]. *Nova Hedwigia*, **70**: 185—192
- Zhu RL (朱瑞良), So ML (苏美灵), 2000b. Additions and correction for Chinese Lejeuneaceae (Hepaticae) [J]. *Botanical Bulletin of Academia Sinica*, **41**: 243—250
- Zhu RL (朱瑞良), So ML (苏美灵), 2000c. Notes on the taxonomy and distribution of *Lejeunea neelgherriana* and *Tuyamaella serratifolia* (Hepaticae, Lejeuneaceae) [J]. *Annales Botanici Fennici*, **37**: 149—153
- Zhu RL (朱瑞良), So ML (苏美灵), 2000d. Reappraisal of *Cololejeunea balansae* (Steph.) Mizut., *C. grushvitzkiana* Pócs, and *C. yoshinagana* (S. Hatt.) Mizut. (Hepaticae, Lejeuneaceae) [J]. *Journal of Bryology*, **22**: 279—282
- Zhu RL (朱瑞良), So ML (苏美灵), 2001. Epiphyllous liverworts of China [J]. *Nova Hedwigia Beiheft*, **121**: 1—418
- Zhu RL (朱瑞良), So ML (苏美灵), 2003. Liverworts and hornworts of Shangsi County of Guangxi (Kwangsi), with an updated checklist of the hepatic flora of Guangxi Province of China [J]. *Cryptogamie Bryologie*, **24** (4): 319—334
- Zhu RL (朱瑞良), So ML (苏美灵), Wang YF (王幼芳), 2002. The genus *Cheilelejeunea* (Hepaticae, Lejeuneaceae) in China [J]. *Nova Hedwigia*, **75** (3-4): 387—408
- Zhu RL (朱瑞良), So ML (苏美灵), Cao T (曹同) *et al.*, 1999. *Neurolejeunea fukiensis* belongs to *Cheilelejeunea* (Lejeuneaceae, Hepaticae) [J]. *Taxon*, **48**: 663—666
- Zhu RL (朱瑞良), Wang D (王丹), Xu L (许玲) *et al.*, 2006. Antibacterial activity in extracts of some bryophytes from China and Mongolia [J]. *Journal of the Hattori Botanical Laboratory*, **100**: 603—615